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NBSIR 80-1833

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

REPORT NO. 63G

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

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1980

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

- Bursting strength
- Tearing strength
- Tensile breaking strength
- Elongation to break
- Tensile energy absorption
- Folding endurance
- Stiffness
- Air resistance
- Grammage
- Smoothness
- Surface pick strength
- K & N ink absorption
- Moisture content
- Opacity
- Blue reflectance (brightness)
- Specular gloss, 75°
- Thickness
- Concora (flat crush)
- Ring crush

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- Mullen burst of linerboard
- Concora test of medium

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- Gloss at 60°
- Color and color difference

CTS Rubber (4 times per year)

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- Hardness
- Mooney viscosity
- Vulcanization properties

ASTM Cement (2 times per year)

- Chemical (11 chemical components)
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AASHTO Bituminous

- Asphalt cement (2 times per year)
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TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM FOR PAPER

Report No. 63G

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NBSIR 80-1833

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRODUCTION

Reports 63S and 63G comprise the third set of reports for the 79-80 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

Notes and comments to individual laboratories and "Best Values" applicable to a particular method are given following Table 1 for each method. See page 1 of this report for an explanation of "Best Values". Please do not confuse these Best Values with provisional values included with the samples to detect serious discrepancies at the time of test.

If there are any questions on the notes, the analyses, or the reports in general, contact Robert G. Powell or Jeffrey Horlick on 301/921-2946.

Jeffrey Horlick

Jeffrey Horlick, Administrator
NBS-TAPPI Collaborative Reference Program
Office of Testing Laboratory Evaluation Technology

June 13, 1980

TAPPI-NBS COLLABORATIVE REFERENCE PROGRAM

BACKGROUND AND PURPOSE

In 1969, the National Bureau of Standards and the Technical Association of the Pulp and Paper Industry established a collaborative reference program to provide a participating laboratory with a means to check periodically the level and uniformity of its testing in comparison with that of other laboratories.

The interchange of paper and board products and of the raw materials for these products requires agreement among raw material suppliers, paper and board producers, converters, distributors, retailers, commercial testing laboratories, user organizations and the ultimate consumer as to the meaning of test results, an agreement that cannot be achieved without accurate and precise testing. This program is designed to help assure agreement.

HOW THE PROGRAM WORKS

Participants Select the Tests in which they wish to participate. This choice is made on joining the program, but additional tests may be added at any time. Also new participants may enter the program at any time.

Test Samples are Distributed Bimonthly; i.e. every 2 months.

Provisional Values are Provided with the Samples for one or both of the test levels, depending on method. The provisional values permit serious discrepancies to be detected without delay. (It is left to the discretion of the laboratory supervisor as to whether these values should be known to the operator.)

Each Participant Tests the Samples, following instructions provided for each test method. The full check on a single instrument should normally take no more than 30 minutes. The test results are then sent to NBS for analysis. The participant is also asked to report other information relevant to an accurate analysis, such as test conditions and the instruments used.

Industry Means, Best Values and Other Statistics are developed from the data by NBS. The best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries.

A Quick Report is Prepared for each participating laboratory reporting data on time. This report shows the industry mean values, and the deviations of the laboratory's results from these values for each test method.

A Longer Summary Report, Showing the Data from all Participants, is also prepared. In the summary report, of which this report is an example, each laboratory is identified by a code number so that the information is maintained on a confidential basis. However, instruments are identified by type so participants can compare their results with those obtained on similar instruments of different manufacture. This report includes test averages, best values and standard deviations for individual participants and for the group as a whole. A participant should be able to readily determine the level and variability of his results in comparison with those of the other laboratories.

Repeatability and Reproducibility Statements such as Contained in ASTM, TAPPI and ISO Standards are included at the end of the report. Participants can check their performance level against the precision statement given in the test method or specification.

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TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

Physical Quantity	To Convert From	To	Multiply by
Bursting strength	psi	kPa	6.895
	kg/cm^2	kPa	98.07
	bar	kPa	100.00
Tearing strength	g	mN	9.807
Tensile strength	lb/in.	kN/m	.1751
	lb/0.5 in.	kN/m	.3502
	lb/15 mm	kN/m	.2965
	kg/15 mm	kN/m	.6538
	kg/25 mm	kN/m	.3923
	kg/mm	kN/m	9.807
Tensile energy absorption	$ft\text{-}lb/ft^2$	J/m^2	14.59
	$in.\text{-}lb/in.^2$	J/m^2	175.1
	$kg\text{-}m/m^2$	J/m^2	9.807
Bending stiffness	g·cm	µN·m	98.07
Flat-crush strength (Concora)	lb	N	4.448
Ring-crush (TAPPI)	lb	N	4.448
(ISO)	lb/6.00 in.	kN/m	0.0292
Thickness	mil	µm	25.40

KEY TO TABLES AND GRAPHS

MEAN -	The average of individual TEST DETERMINATIONS. The number of TEST DETERMINATIONS in the mean is given in the upper right corner of the first table (TEST D.) and again at the bottom of this table.
GRAND MEAN - (GR. MEAN)	The average of the individual laboratory MEANS, excluding laboratories flagged (see column F) with an X, #, or +. The GRAND MEAN is given in US customary units and, where applicable, in SI metric units.
SD OF MEANS - (SD MEANS)	The standard deviation of the laboratory MEANS about the GRAND MEAN; an index of the among-laboratory precision.
DEV -	The deviation or difference of the laboratory MEAN from the GRAND MEAN.
N. DEV -	The normal deviate or ratio of the DEV to the SD OF MEANS; an indication of the degree of divergence of the laboratory MEAN from the GRAND MEAN. A N. DEV of more than 2 or less than -2 may indicate that the participant is not following the procedure considered standard for this analysis.
SDR -	The standard deviation of repeated measurements; that is, of individual test determinations about their MEAN.
AVERAGE SDR -	The average of the individual laboratory SDR's; an index of the within-laboratory precision of repeated measurements.
R. SDR -	The relative standard deviation of repeated measurements; that is, the ratio of the SDR to the AVERAGE SDR: an indication of the ability of a participant to repeat his or her measurements relative to the average ability. The greater the number of TEST DETERMINATIONS the closer the R. SDR should be to unity. If R. SDR is outside the limits given below, the participant may not be following the procedure considered standard for this analysis:

No. of test Determinations	Lower limit for R. SDR	Upper limit for R. SDR
3	0.09	2.58
4	0.18	2.25
5	0.26	2.06
8	0.40	1.77
10	0.46	1.67
15	0.56	1.53
20	0.61	1.45
25	0.65	1.39

VAR -	Code for instrument type or variation in condition, see second table.
F -	Flag, with following meaning:
O -	Included in grand mean and inside 95% error ellipse.
* -	Included in grand means but plotted point falls outside of the 95% error ellipse. The participant should take this as a warning to reexamine his or her testing procedure.
X -	Excluded because plotted point would fall outside of the 99% error ellipse, (see page 2 for explanation of Graph).
# -	Excluded because data were not understood or because of a non-coded variation reported by the laboratory. (See the notes following Table 1 for each method).
+ -	Excluded from grand means because VAR was non-standard for the analysis.
M -	Excluded because data for one sample are missing.
S -	Included in grand mean but only after omission of one or more 'wild' values; that is test determinations more than 3 times AVERAGE SDR from the laboratory's MEAN. Not more than 20% of the test determination may be excluded in this manner without rejecting the laboratory.
Best values -	Given at the end of Table 1 for each method for which sufficient information is available. These best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries. All participants using equipment that is standard for the analysis should be able to achieve results within the plus-minus (+/-) limits, when these are shown along with the best values.
COORDINATES -	Distances along major and minor axes of error ellipse. If special additive or concurrent model of the measuring process applies to this method, the distance along the minor axis represents the random error within a laboratory while that along the major axis also includes a systematic laboratory component of error.
95% ELLIPSE -	Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.
AVG R. SDR -	Average of the R. SDR for the two samples; an indication of the laboratory's precision of repeated measurements.

Graph -	For each laboratory the MEAN for the second sample is plotted against the MEAN for the first sample, with each point representing a laboratory. The horizontal and vertical lines are the GRAND MEANS. The dashed line is drawn at 45 degrees. The solid sloping line, which may or may not lie close to the 45 degree line, is along the major axis of the error ellipse. The ellipse is drawn so that, on the average, it will include 95% of the points representing the laboratories. Plotted symbols are as explained above (under F), except that an 'S' is plotted as an 'O'. A participant whose plotted point falls outside of the ellipse should carefully reexamine the testing procedure he or she is following. The graph is plotted with an ellipse when there are 20 or more laboratories in the analysis. When there are 10 through 19 laboratories in the analysis, the graph is plotted but the ellipse is omitted. When there are fewer than 10 laboratories retained in the analysis, the graph is not plotted. The International System of Units (SI) is used on the plots wherever possible to aid participants in familiarizing themselves with SI. Grand means in SI units are given at the top of the plot, and supplementary scales in SI units are drawn along the axes allowing the reader to compare means and variability in common units and SI units for the same data.
SUMMARY - (At end of report)	In addition to several quantities already defined above, the summary shows the following values for each test method:
REPL CRP -	The number of replicate test determinations used in this Collaborative Reference Program.
REPL TAPPI -	The number of replicate test determinations in a test result required by the applicable TAPPI Official Test Method or assumed here if there is no TAPPI Official Test Method. This quantity is needed in the computation of TAPPI repeatability and reproducibility from the SD OF MEANS and the AVERAGE SDR. See TAPPI Official Test Method T1206 for definitions and computations.
REPEAT -	TAPPI repeatability; a measure of the within-laboratory precision of a test result.
REPROD -	TAPPI reproducibility; a measure of the between-laboratory precision of a test result.

REPORT NO. 63G TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 140-1 TABLE 1

AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)

TAPPI OFFICIAL TEST METHOD T460 OS-75, AIR RESISTANCE OF PAPER

LAB CODE	SAMPLE B68 MEAN	HEAT-SET OFFSET BOOK 93 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE Z08 MEAN	M.F. SULPHITE 36 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D. = 10 VAR	F	LAB
L100	44.6	-4.6	-1.44	3.5	.75	89.8	-6.0	-.77	7.0	.78	40D	0	L100
L106	46.5	-2.7	-.85	5.6	1.19	93.6	-2.2	-.28	10.8	1.21	40D	0	L106
L107	46.9	-2.3	-.72	4.8	1.02	92.5	-3.3	-.42	10.6	1.19	40D	0	L107
L121	50.5	1.3	.40	5.1	1.09	85.0	-10.8	-1.37	9.5	1.07	40D	0	L121
L122	51.5	2.2	.70	3.8	.81	98.3	2.5	.31	6.1	.68	40D	0	L122
L123	50.2	.9	.29	4.4	.94	95.7	-.1	-.01	9.9	1.11	40D	0	L123
L124G	48.5	-.7	-.23	6.3	1.33	106.0	10.2	1.29	9.9	1.12	40D	0	L124G
L125	48.9	-.3	-.10	4.4	.94	97.7	1.9	.24	8.9	1.00	40D	0	L125
L128	52.3	3.1	.96	5.7	1.22	100.2	4.4	.55	10.9	1.22	40D	0	L128
L141	49.2	.0	.01	5.1	1.09	99.4	3.6	.45	10.8	1.21	40D	0	L141
L148	48.7	-.5	-.16	3.8	.81	102.5	6.7	.85	4.8	.54	40D	0	L148
L153	48.1	-1.1	-.35	4.4	.94	94.1	-1.7	-.22	7.6	.85	40D	0	L153
L158	47.5	-1.7	-.54	4.7	.99	90.0	-5.8	-.74	4.8	.54	40D	0	L158
L159	44.1	-5.1	-1.58	2.9	.61	88.7	-7.1	-.90	12.7	1.43	40D	0	L159
L163	45.8	-3.4	-1.07	2.0	.43	95.2	-.6	-.08	5.6	.63	40D	0	L163
L166	51.4	2.2	.67	4.6	.97	103.8	8.0	1.02	10.7	1.20	40D	0	L166
L174	48.1	-1.1	-.34	4.7	.99	98.5	2.6	.33	7.9	.89	40D	0	L174
L176	50.0	.8	.23	4.7	1.00	93.7	-2.1	-.27	5.0	.56	40D	0	L176
L182G	50.5	1.3	.40	8.2	1.74	92.1	-3.7	-.47	11.7	1.31	40D	0	L182G
L183	49.7	.5	.15	8.5	1.81	96.4	.6	.07	13.1	1.47	40D	0	L183
L190C	53.2	4.0	1.24	5.3	1.13	95.3	-.5	-.07	9.1	1.02	40D	0	L190C
L190R	39.2	-10.0	-3.12	3.5	.74	82.6	-13.2	-1.68	10.9	1.23	40D	*	L190R
L212	46.7	-2.5	-.79	5.4	1.14	95.1	-.7	-.09	13.8	1.55	40D	0	L212
L219	47.1	-2.1	-.66	2.8	.60	80.5	-15.3	-1.95	6.7	.75	40D	0	L219
L223	51.8	2.6	.80	4.6	.97	101.7	5.9	.75	4.9	.56	40D	0	L223
L230G	49.9	.7	.21	4.5	.95	104.1	8.3	1.05	8.6	.96	40D	0	L230G
L238A	47.2	-2.0	-.63	6.1	1.28	84.8	-11.0	-1.40	10.7	1.21	40D	C	L238A
L241	45.4	-3.8	-1.19	3.6	.76	81.0	-14.8	-1.88	8.4	.94	40D	0	L241
L242	35.1	-14.1	-4.39	3.1	.67	51.8	-44.0	-5.59	4.7	.53	40D	#	L242
L243G	51.3	2.1	.64	3.6	.76	88.1	-7.7	-.98	8.4	.94	40D	0	L243G
L254	52.2	3.0	.92	4.4	.94	97.8	2.0	.25	9.0	1.01	40D	0	L254
L259	47.3	-1.9	-.59	5.6	1.18	92.9	-2.9	-.37	10.3	1.16	40D	0	L259
L261	48.4	-.8	-.26	3.0	.63	47.8	-48.0	-6.09	2.8	.31	40D	#	L261
L262G	43.0	-6.2	-1.94	4.2	.89	58.1	-37.7	-4.78	3.2	.36	40D	#	L262G
L278	47.4	-1.9	-.58	3.9	.82	79.4	-16.5	-2.09	9.0	1.02	40D	0	L278
L285	50.7	1.5	.46	2.9	.62	103.4	7.6	.96	10.0	1.12	40D	0	L285
L308	53.7	4.5	1.39	2.5	.53	95.4	-.4	-.05	8.9	1.00	40D	C	L308
L313	48.0	-1.2	-.37	5.4	1.14	98.0	2.1	.27	10.0	1.12	40D	0	L313
L320	43.2	-6.0	-1.87	2.5	.54	80.8	-15.0	-1.91	2.5	.28	40D	C	L320
L321	49.4	.2	.05	3.0	.63	106.4	10.6	1.34	9.8	1.10	40D	0	L321
L324	51.1	1.9	.60	7.1	1.51	95.1	-.7	-.09	6.7	.75	40D	0	L324
L326	53.5	4.3	1.33	5.0	1.06	102.0	6.2	.78	9.0	1.01	40D	0	L326
L328	54.4	5.2	1.60	6.7	1.41	100.1	4.2	.54	12.8	1.44	40D	0	L328
L337	46.0	-3.2	-.99	6.0	1.27	94.7	-1.1	-.14	7.5	.85	40D	0	L337
L339	41.7	-7.5	-2.33	5.1	1.09	64.8	-31.0	-3.94	8.9	1.00	40D	#	L339
L348	54.1	4.9	1.52	4.9	1.05	107.6	11.8	1.49	8.0	.90	40D	0	L348
L376	53.6	4.3	1.35	7.4	1.56	109.1	13.3	1.69	28.0	3.15	40D	C	L376
L380	50.8	1.6	.49	4.9	1.04	92.3	-3.5	-.45	6.2	.70	40D	0	L380
L388	51.7	2.4	.76	5.2	1.10	106.6	10.7	1.36	9.8	1.11	40D	0	L388
L396M	51.1	1.9	.58	5.8	1.24	98.8	3.0	.38	4.6	.52	40D	0	L396M
L484	45.8	-3.4	-1.07	4.1	.87	90.7	-5.1	-.65	8.0	.90	40B	0	L484
L554	55.2	6.0	1.86	6.7	1.43	117.2	21.4	2.71	10.7	1.20	40D	*	L554
L567	51.4	2.2	.68	4.2	.90	99.3	3.4	.44	11.4	1.28	40D	0	L567
L576	49.6	.4	.12	4.8	1.02	88.7	-7.1	-.90	5.7	.64	40D	C	L576
L585	51.6	2.4	.74	7.5	1.58	105.4	9.6	1.21	11.2	1.26	40D	0	L585
L616	45.3	-3.9	-1.22	1.8	.39	93.9	-1.9	-.25	3.7	.42	40B	0	L616
L636	44.5	-4.7	-1.47	4.7	1.00	85.1	-10.7	-1.36	6.7	.75	40D	0	L636
L651	35.6	-13.6	-4.24	4.9	1.04	70.6	-25.2	-3.20	8.7	.98	40D	#	L651
L676	51.6	2.3	.73	3.9	.82	105.2	9.4	1.19	7.7	.86	40D	0	L676
L697	47.1	-2.1	-.66	3.4	.72	93.1	-2.7	-.35	9.4	1.06	40D	0	L697
L702	50.5	1.3	.40	5.8	1.22	96.0	.2	.02	7.9	.89	40D	0	L702
L715	53.8	4.6	1.43	4.0	.85	102.2	6.4	.81	6.4	.72	40D	0	L715
L737	45.7	-3.5	-1.09	3.4	.72	94.5	-1.3	-.17	8.9	1.00	40D	0	L737

GR. MEAN = 49.2 GURLEY UNITS GRAND MEAN = 95.8 GURLEY UNITS TEST DETERMINATIONS = 10

SD MEANS = 3.2 GURLEY UNITS SD OF MEANS = 7.9 GURLEY UNITS 58 LABS IN GRAND MEANS

AVERAGE SDR = 4.7 GURLEY UNITS AVERAGE SDR = 8.9 GURLEY UNITS

L115	45.2	-4.0	-1.25	1.7	.36	NO DATA REPORTED FOR SAMPLE Z08					40U	*	L115
L291	46.4	-2.8	-.88	5.4	1.14	112.8	17.0	2.15	6.8	.76	40U	*	L291

TOTAL NUMBER OF LABORATORIES REPORTING = 65

Best values: B68 49.3 ± 4.7 Gurley units
Z08 96 ± 12 Gurley units

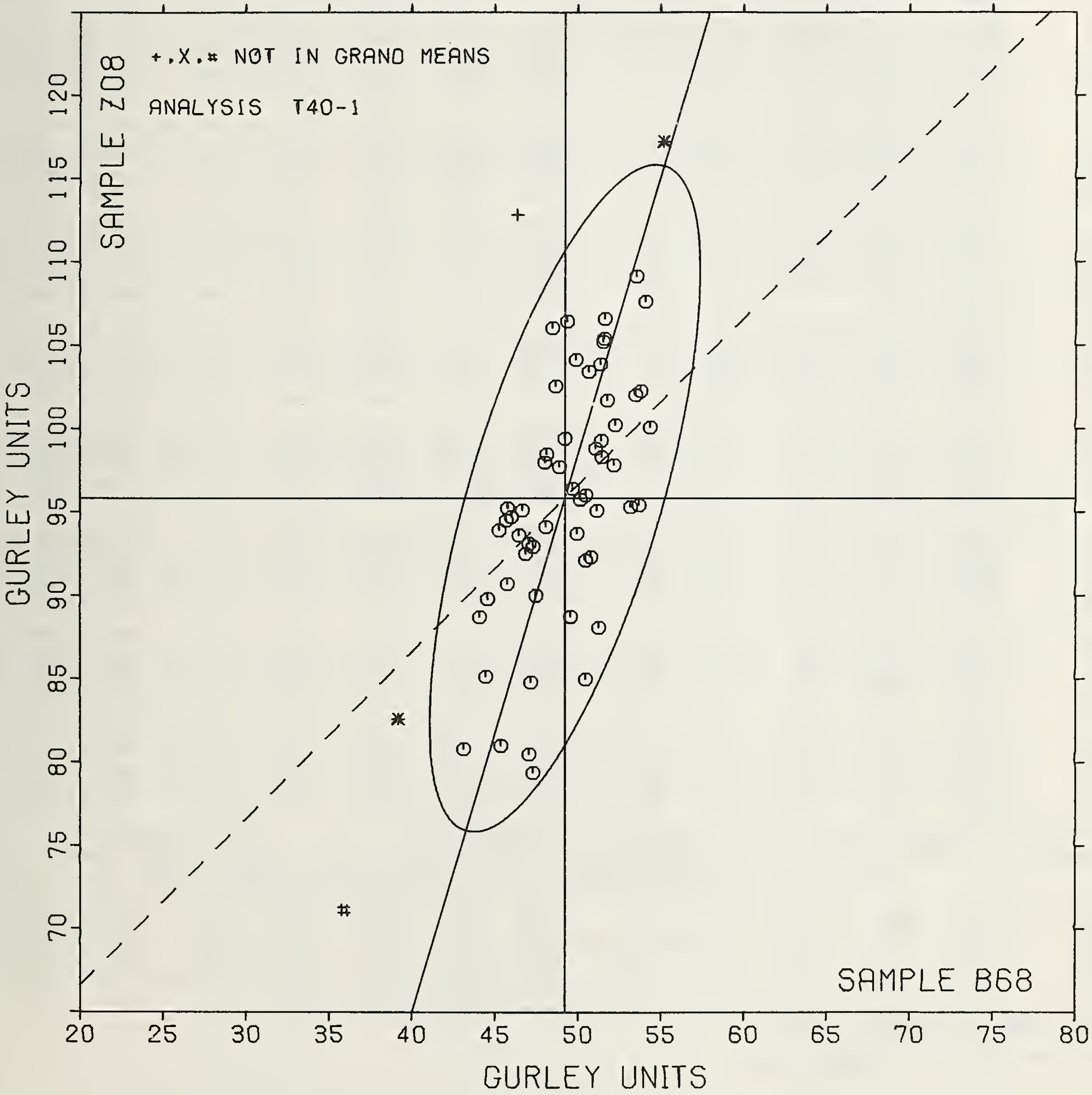
The following laboratories were omitted from the grand means because of extreme test results: 242, 261, 262G, 339, 651

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T40-1 TABLE 2
AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
TAPPI OFFICIAL TEST METHOD T460 OS-75, AIR RESISTANCE OF PAPER

LAB CODE	F	MEANS B68	Z08	COORDINATES MAJOR	MINOR	AVG R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L242	#	35.1	51.8	-46.2	.9	.60	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L651	#	35.6	70.6	-28.1	5.8	1.01	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L190R	*	39.2	82.6	-15.5	5.8	.98	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L339	#	41.7	64.8	-31.9	-1.7	1.04	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L262G	#	43.0	58.1	-37.9	-4.8	.62	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L320	O	43.2	80.8	-16.1	1.5	.41	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L159	O	44.1	88.7	-8.3	2.8	1.02	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L636	O	44.5	85.1	-11.6	1.5	.87	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L100	O	44.6	89.8	-7.1	2.7	.77	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L115	•	45.2				.36	40U	AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS
L616	O	45.3	93.9	-3.0	3.2	.40	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L241	O	45.4	81.0	-15.3	-.6	.85	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L737	O	45.7	94.5	-2.3	3.0	.86	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L484	O	45.8	90.7	-5.9	1.8	.88	40H	AIR RESISTANCE, REGMED-TYPE GURLEY DENSOMETER -OIL FLOTATION
L163	O	45.8	95.2	-1.6	3.1	.53	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L337	O	46.0	94.7	-2.0	2.7	1.06	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L291	•	46.4	112.8	15.4	7.6	.95	40U	AIR RESISTANCE, SHEFFIELD IN GURLEY UNITS
L106	O	46.5	93.6	-2.9	2.0	1.20	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L212	O	46.7	95.1	-1.4	2.2	1.35	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L107	O	46.9	92.5	-3.9	1.3	1.11	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L697	O	47.1	93.1	-3.2	1.3	.89	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L219	O	47.1	80.5	-15.3	-2.4	.68	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L238A	O	47.2	84.8	-11.1	-1.2	1.24	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L259	O	47.3	92.9	-3.3	1.0	1.17	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L278	O	47.4	79.4	-16.3	-2.9	.92	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L158	O	47.5	90.0	-6.1	-.0	.77	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L313	O	48.0	98.0	1.7	1.7	1.13	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L153	O	48.1	94.1	-2.0	.6	.90	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L174	O	48.1	98.5	2.2	1.8	.94	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L261	#	48.4	47.8	-46.2	-12.9	.47	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L124G	O	48.5	106.0	9.5	3.6	1.22	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L148	O	48.7	102.5	6.3	2.4	.67	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L125	O	48.9	97.7	1.7	.8	.97	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L141	O	49.2	99.4	3.4	1.0	1.15	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L321	O	49.4	106.4	10.2	2.9	.86	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L576	O	49.6	88.7	-6.7	-2.4	.83	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L183	O	49.7	96.4	.7	-.3	1.64	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L230G	O	49.9	104.1	8.1	1.7	.96	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L176	O	50.0	93.7	-1.8	-1.3	.78	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L123	O	50.2	96.7	.2	-.9	1.03	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L182G	O	50.5	92.1	-3.2	-2.3	1.53	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L702	O	50.5	96.0	.5	-1.2	1.06	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L121	O	50.5	85.0	-10.0	-4.3	1.08	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L285	O	50.7	103.4	7.7	.8	.87	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L380	O	50.8	92.3	-2.9	-2.5	.87	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L396M	O	51.1	98.8	3.4	-.9	.88	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L324	O	51.1	95.1	-.2	-2.1	1.13	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L243G	O	51.3	88.1	-6.8	-4.2	.85	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L166	O	51.4	103.8	8.3	.2	1.08	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L567	O	51.4	99.3	3.9	-1.1	1.09	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L122	O	51.5	98.3	3.0	-1.4	.75	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L676	O	51.6	105.2	9.6	.5	.84	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L585	O	51.6	105.4	9.8	.5	1.42	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L388	O	51.7	106.6	11.0	.7	1.10	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L223	O	51.8	101.7	6.4	-.8	.76	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L254	O	52.2	97.8	2.7	-2.3	.98	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L128	O	52.3	100.2	5.1	-1.7	1.22	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L190C	O	53.2	95.3	.6	-4.0	1.07	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L326	O	53.5	102.0	7.1	-2.3	1.04	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L376	O	53.6	109.1	14.0	-.3	2.35	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L308	O	53.7	95.4	.9	-4.4	.77	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L715	O	53.8	102.2	7.5	-2.5	.79	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L348	O	54.1	107.6	12.7	-1.3	.97	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L328	O	54.4	100.1	5.5	-3.7	1.43	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
L554	*	55.2	117.2	22.2	.4	1.32	40D	AIR RESISTANCE, GURLEY DENSOMETER - OIL FLOTATION
GMEANS:		49.2	95.8			1.00		
		95% ELLIPSE		20.8	5.8	WITH GAMMA = 73 DEGREES		

AIR RESISTANCE, GURLEY

SAMPLE B68 = 49. GURLEY UNITS SAMPLE Z08 = 96. GURLEY UNITS



ANALYSIS 140-2 TABLE 1

AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE

TAPPI USEFUL TEST METHOD UM 524, POROSITY BY RESISTANCE TO AIRFLOW

	SAMPLE	HEAT-SET OFFSET BOOK				SAMPLE	M.F. SULPHITE				TEST D. = 10		
LAB	B68	93 GRAMS PER SQUARE METER				Z08	36 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L114	79.5	8.3	1.68	5.6	.86	35.5	-.7	-.23	4.5	1.50	40S	O	L114
L121	80.5	9.3	1.89	6.4	.98	41.5	5.3	1.74	4.7	1.58	40S	O	L121
L122S	71.5	.3	.07	8.1	1.24	37.3	1.1	.36	4.4	1.47	40S	O	L122S
L124S	72.1	.9	.19	7.0	1.07	35.2	-1.0	-.33	3.0	1.00	40S	O	L124S
L132	66.2	-5.0	-1.01	7.7	1.17	39.1	2.9	.95	4.9	1.62	40S	O	L132
L148	64.3	-6.9	-1.39	8.1	1.24	28.3	-7.9	-2.59	1.6	.55	40S	*	L148
L150	72.3	1.1	.23	9.1	1.39	37.5	1.3	.42	3.5	1.16	40S	O	L150
L157	71.4	.2	.05	7.5	1.15	35.0	-1.2	-.40	2.6	.86	40S	O	L157
L158	77.5	6.3	1.28	5.9	.90	41.2	5.0	1.64	2.2	.73	40S	O	L158
L173B	65.0	-6.2	-1.25	6.2	.95	32.6	-3.6	-1.18	2.0	.67	40S	O	L173B
L190C	79.3	8.1	1.64	5.5	.84	37.7	1.5	.49	4.8	1.59	40S	O	L190C
L213	72.0	.8	.17	5.8	.89	36.3	.1	.03	2.5	.83	40S	O	L213
L223	70.5	-.7	-.14	4.5	.68	37.0	.8	.26	2.4	.82	40S	O	L223
L228	71.9	.7	.15	2.5	.38	36.8	.6	.19	2.7	.89	40S	O	L228
L230S	75.1	3.9	.79	6.2	.94	34.4	-1.8	-.59	2.5	.82	40S	O	L230S
L233	64.1	-7.1	-1.43	8.5	1.30	36.9	.7	.23	3.3	1.12	40S	O	L233
L241	83.0	11.8	2.39	3.6	.54	48.3	12.1	3.96	3.4	1.13	40S	X	L241
L249	70.2	-1.0	-.20	4.6	.70	34.3	-1.9	-.62	2.4	.80	40S	O	L249
L255	63.7	-7.5	-1.51	7.5	1.15	34.5	-1.7	-.56	2.8	.95	40S	O	L255
L260	71.7	.5	.11	6.1	.94	34.9	-1.3	-.43	2.4	.79	40S	O	L260
L262S	72.1	.9	.19	4.4	.66	36.2	-.0	-.00	3.1	1.03	40S	O	L262S
L288	77.1	5.9	1.20	5.7	.86	32.3	-3.9	-1.28	3.6	1.20	40S	O	L288
L305	60.7	-10.5	-2.12	7.1	1.08	34.3	-1.9	-.62	3.4	1.12	40S	O	L305
L315	63.5	-7.7	-1.55	5.0	.77	31.2	-5.0	-1.64	2.3	.78	40S	O	L315
L318	72.4	1.2	.25	10.2	1.56	37.8	1.6	.52	4.0	1.34	40S	O	L318
L352	72.2	1.0	.21	6.3	.96	35.4	-.8	-.26	2.2	.72	40S	O	L352
L354	69.1	-2.1	-.42	7.3	1.12	35.6	-.6	-.20	2.4	.80	40S	O	L354
L360	73.8	2.6	.53	7.6	1.15	37.6	1.4	.46	2.4	.79	40S	O	L360
L562	84.0	12.8	2.59	10.5	1.61	54.6	18.4	6.03	5.5	1.83	40S	X	L562
L575	67.8	-3.4	-.68	8.2	1.24	35.3	-.9	-.30	2.9	.98	40S	O	L575
L585	68.5	-2.7	-.54	8.5	1.30	33.4	-2.8	-.92	2.9	.96	40S	O	L585
L600	73.1	1.9	.39	3.1	.47	36.9	.7	.23	3.3	1.09	40S	O	L600
L626	67.8	-3.4	-.68	6.3	.96	33.6	-2.6	-.85	1.6	.55	40S	O	L626
L684	76.2	5.0	1.02	1.8	.27	37.5	1.3	.42	2.3	.77	40S	O	L684
L687	72.7	1.5	.31	8.6	1.31	39.9	3.7	1.21	2.2	.73	40S	O	L687
L698	64.2	-7.0	-1.41	8.9	1.36	38.3	2.1	.69	3.1	1.02	40S	O	L698
L704	75.5	4.3	.87	5.5	.84	36.5	.3	.10	2.5	.84	40S	O	L704
L729	52.9	-18.3	-3.70	5.7	.86	23.9	-12.3	-4.03	3.1	1.05	40S	X	L729
L738	77.0	5.8	1.18	9.8	1.49	45.8	9.6	3.14	5.5	1.82	40S	*	L738
L740	71.0	-.2	-.04	10.2	1.56	36.0	-.2	-.07	3.2	1.08	40S	O	L740

GR. MEAN = 71.2 SHEFF. UNITS GRAND MEAN = 36.2 SHEFF. UNITS TEST DETERMINATIONS = 10

SD MEANS = 4.9 SHEFF. UNITS SD OF MEANS = 3.1 SHEFF. UNITS 37 LABS IN GRAND MEANS

AVERAGE SDR = 6.6 SHEFF. UNITS AVERAGE SDR = 3.0 SHEFF. UNITS

L182B	138.0	66.8	13.52	14.2	2.16	251.5	215.3	70.56	33.7	11.22	40B	+	L182B
L243B	204.4	133.2	26.95	17.3	2.64	107.5	71.3	23.36	4.5	1.50	40B	+	L243B
L280	118.0	46.8	9.47	21.0	3.21	66.6	30.4	9.96	4.6	1.55	40B	+	L280
L312	78.4	7.2	1.46	4.8	.73	37.7	1.5	.49	4.2	1.41	40T	+	L312
L333	222.0	150.8	30.51	20.4	3.12	140.0	103.8	34.02	10.5	3.51	40B	+	L333
L484	289.0	217.8	44.06	28.8	4.40	259.0	222.8	73.01	13.7	4.57	40B	+	L484

TOTAL NUMBER OF LABORATORIES REPORTING = 46

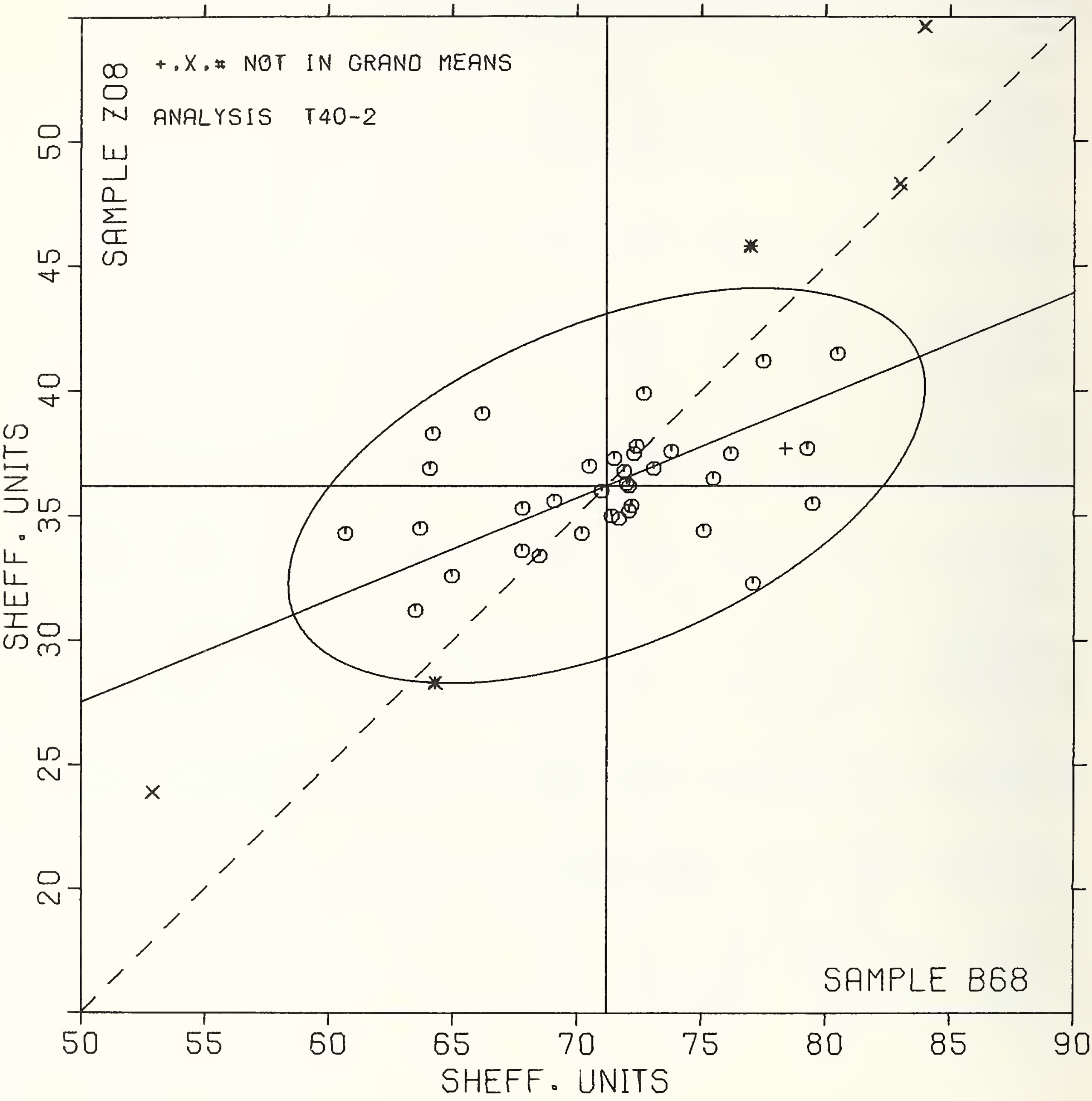
Best values: B68 71 ± 8 Sheffield units
Z08 36 ± 5 Sheffield units

ANALYSIS 140-2 TABLE 2
AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE
TAPPI USEFUL TEST METHOD UM 524, POROSITY BY RESISTANCE TO AIRFLOW

LAB CODE	F	MEANS B68	MEANS Z08	COORDINATES MAJOR	COORDINATES MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L729	X	52.9	23.9	-21.6	-4.4	.96	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L305	O	60.7	34.3	-10.4	2.2	1.10	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L315	O	63.5	31.2	-9.0	-1.7	.77	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L255	O	63.7	34.5	-7.6	1.3	1.05	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L233	O	64.1	36.9	-6.3	3.3	1.21	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L698	O	64.2	38.3	-5.7	4.6	1.19	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L148	*	64.3	28.3	-9.4	-4.7	.89	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L173H	O	65.0	32.6	-7.1	-1.0	.81	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L132	O	66.2	39.1	-3.5	4.6	1.39	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L626	O	67.8	33.6	-4.1	-1.1	.75	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L575	O	67.8	35.3	-3.5	.4	1.11	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L585	O	68.5	33.4	-3.5	-1.6	1.13	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L354	O	69.1	35.6	-2.2	.2	.96	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L249	O	70.2	34.3	-1.6	-1.4	.75	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L223	O	70.5	37.0	-.3	1.0	.75	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L740	O	71.0	36.0	-.2	-.1	1.32	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L157	O	71.4	35.0	-.2	-1.2	1.00	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L122S	O	71.5	37.3	.7	.9	1.35	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L260	O	71.7	34.9	-.0	-1.4	.87	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L228	O	71.9	36.8	.9	.3	.63	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L213	O	72.0	36.3	.8	-.2	.86	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L262S	O	72.1	36.2	.9	-.4	.85	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L124S	O	72.1	35.2	.5	-1.3	1.04	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L352	O	72.2	35.4	.6	-1.1	.84	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L150	O	72.3	37.5	1.5	.8	1.27	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L318	O	72.4	37.8	1.7	1.0	1.45	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L687	O	72.7	39.9	2.8	2.8	1.02	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L600	O	73.1	36.9	2.0	-.1	.78	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L360	O	73.8	37.6	3.0	.3	.97	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L230S	O	75.1	34.4	2.9	-3.2	.88	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L704	O	75.5	36.5	4.1	-1.4	.84	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L684	O	76.2	37.5	5.1	-.7	.52	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L738	*	77.0	45.8	9.0	6.7	1.65	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L288	O	77.1	32.3	4.0	-5.9	1.03	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L158	O	77.5	41.2	7.7	2.2	.82	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L312	+	78.4	37.7	7.3	-1.4	1.07	40T	AIR RESISTANCE, SHEFFIELD (3 INCH DIAMETER ORIFICE)
L190C	O	79.3	37.7	8.1	-1.7	1.21	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L114	O	79.5	35.5	7.4	-3.8	1.18	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L121	O	80.5	41.5	10.6	1.4	1.28	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L241	X	83.0	48.3	15.5	6.7	.84	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L562	X	84.0	54.6	18.8	12.2	1.72	40S	AIR RESISTANCE, SHEFFIELD (3/4 INCH DIAMETER ORIFICE)
L280	+	118.0	66.6	54.9	10.3	2.38	40H	AIR RESISTANCE, BENDTSEN, WG 150
L182H	+	138.0	251.5	143.5	173.8	6.69	40H	AIR RESISTANCE, BENDTSEN, WG 150
L243H	+	204.4	107.5	150.3	15.4	2.07	40H	AIR RESISTANCE, BENDTSEN, WG 150
L333	+	222.0	140.0	178.9	38.8	3.32	40H	AIR RESISTANCE, BENDTSEN, WG 150
L484	+	289.0	259.0	286.1	123.4	4.48	40H	AIR RESISTANCE, BENDTSEN, WG 150
GMEANS:		71.2	36.2			1.00		
		95% ELLIPSE:		13.6	6.5	WITH GAMMA = 22 DEGREES		

AIR RESISTANCE, SHEFFIELD

SAMPLE B68 = 71.2 SHEFF. UNITS SAMPLE Z08 = 36.2 SHEFF. UNITS



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ANALYSIS T41-1 TABLE 1
AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
DIRECT READING, SEC/10 CC, MERCURY DENSITY

	SAMPLE	BLEACHED BACKING				SAMPLE	RELEASE BASE				TEST D. = 10		
LAB	E37	69 GRAMS PER SQUARE METER				B73	116 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N. DEV	SDR	R. SDR	MEAN	DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L122	781.	18.	.31	89.	.86	1258.	-26.	-.10	269.	.50	41G	0	L122
L128	702.	-61.	-1.08	64.	.62	1167.	-117.	-.46	276.	.52	41G	0	L128
L134	778.	15.	.26	53.	.52	1560.	276.	1.09	763.	1.43	41G	0	L134
L166M	829.	65.	1.15	72.	.70	1233.	-52.	-.20	485.	.91	41G	0	L166M
L195	747.	-17.	-.29	88.	.85	1049.	-235.	-.93	364.	.68	41G	0	L195
L224	815.	51.	.90	65.	.63	1864.	580.	2.29	503.	.94	41G	0	L224
L230	688.	-76.	-1.33	57.	.55	1204.	-81.	-.32	594.	1.11	41G	0	L230
L259	699.	-64.	-1.13	94.	.91	1155.	-129.	-.51	615.	1.15	41G	0	L259
L312	792.	29.	.51	61.	.59	1403.	118.	.47	516.	.97	41G	0	L312
L358	683.	-81.	-1.42	247.	2.39	807.	-477.	-1.88	208.	.39	41G	0	L358
L554	738.	-26.	-.45	73.	.70	1089.	-195.	-.77	238.	.45	41G	0	L554
L558	719.	-44.	-.78	66.	.64	1400.	116.	.46	893.	1.67	41G	0	L558
L574	861.	97.	1.71	314.	3.04	1304.	20.	.08	702.	1.31	41G	0	L574
L576	805.	42.	.73	98.	.95	1189.	-95.	-.37	494.	.93	41G	0	L576
L697	816.	53.	.93	108.	1.05	1580.	296.	1.17	1086.	2.04	41G	0	L697

GR. MEAN = 764. SEC/10 CC GRAND MEAN = 1284. SEC/10 CC TEST DETERMINATIONS = 10
SD MEANS = 57. SEC/10 CC SD OF MEANS = 253. SEC/10 CC 15 LABS IN GRAND MEANS
AVERAGE SDR = 103. SEC/10 CC AVERAGE SDR = 534. SEC/10 CC
TOTAL NUMBER OF LABORATORIES REPORTING = 15

Best values: E37 770 ± 90 Seconds per 10cc,
B73 1280 ± 470 mercury density,
(direct reading)

The values reported here are the time in seconds required for the displacement of 10 ml of air through an area of 1.0 sq. in. of the specimen. The values are not converted to 100ml of air nor to oil density.

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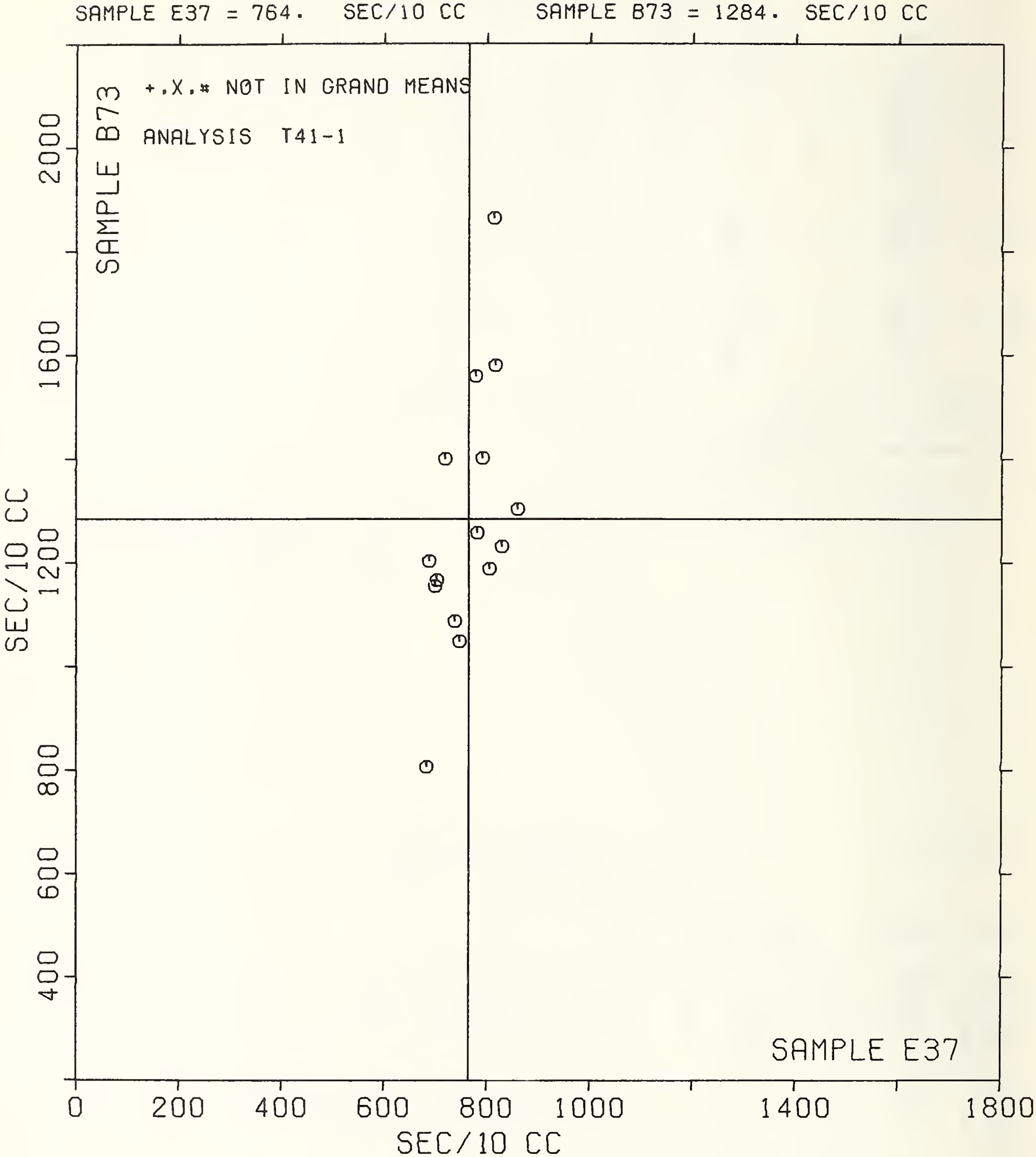
ANALYSIS T41-1 TABLE 2
AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
DIRECT READING, SEC/10 CC, MERCURY DENSITY

LAB		MEANS		COORDINATES		AVG		
CODE	F	E37	B73	MAJOR	MINOR	R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L358	0	683.	807.	-483.	20.	1.39	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L230	0	688.	1204.	-90.	65.	.83	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L259	0	699.	1155.	-136.	48.	1.03	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L128	0	702.	1167.	-124.	46.	.57	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L558	0	719.	1400.	109.	59.	1.16	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L554	0	738.	1089.	-197.	1.	.58	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L195	0	747.	1049.	-235.	-13.	.77	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L134	0	778.	1560.	275.	20.	.97	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L122	0	781.	1258.	-23.	-21.	.68	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L312	0	792.	1403.	121.	-14.	.78	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L576	0	805.	1189.	-89.	-53.	.94	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L224	0	815.	1864.	582.	23.	.78	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L697	0	816.	1580.	301.	-15.	1.54	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L166M	0	829.	1233.	-43.	-71.	.80	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
L574	0	861.	1304.	32.	-94.	2.18	41G	AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
GMEANS:		764.	1284.			1.00		
		95% ELLIPSE:		731.	135.	WITH GAMMA = 82 DEGREES		

AIR RESISTANCE, GURLEY HG FLOTATION



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TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T44-1 TABLE 1
SMOOTHNESS, PARKER PRINTSURF

LAB CODE	SAMPLE A84 MEAN	VELLUM ENVELOPE 91 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE A83 MEAN	OFFSET PRINTING 94 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L122	6.668	.985	3.97	.107	1.26	5.424	.858	4.38	.340	1.96	44P	#	L122
L182	6.090	.407	1.64	.061	.73	4.850	.284	1.45	.151	.87	44P	Ө	L182
L288	5.700	.017	.07	.047	.56	4.630	.064	.33	.241	1.39	44P	Ө	L288
L317	5.690	.007	.03	.088	1.03	4.290	-.276	-1.41	.120	.69	44P	Ө	L317
L484	5.540	-.143	-.58	.081	.96	4.570	.004	.02	.169	.97	44F	Ө	L484
L588	5.340	-.343	-1.39	.097	1.14	4.410	-.156	-.80	.228	1.32	44P	Ө	L588
L669	5.741	.058	.23	.134	1.59	4.646	.080	.41	.133	.77	44P	Ө	L669

GR. MEAN = 5.683 MICRONS | GRAND MEAN = 4.566 MICRONS | TEST DETERMINATIONS = 10

SD MEANS = .248 MICRONS | SD OF MEANS = .196 MICRONS | 6 LABS IN GRAND MEANS

AVERAGE SDR = .085 MICRONS | AVERAGE SDR = .174 MICRONS

TOTAL NUMBER OF LABORATORIES REPORTING = 7

Best values: A84 5.7 microns
A83 4.6 microns

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TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T44-1 TABLE 2
SMOOTHNESS, PARKER PRINTSURF

LAB CODE	F	MEANS A84	A83	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L588	Ө	5.340	4.410	-.370	.074	1.23	44P	SMOOTHNESS, PARKER PRINTSURF
L484	Ө	5.540	4.570	-.114	.087	.96	44P	SMOOTHNESS, PARKER PRINTSURF
L317	Ө	5.690	4.290	-.156	-.228	.86	44P	SMOOTHNESS, PARKER PRINTSURF
L288	Ө	5.700	4.630	.051	.042	.97	44P	SMOOTHNESS, PARKER PRINTSURF
L669	Ө	5.741	4.646	.093	.031	1.18	44P	SMOOTHNESS, PARKER PRINTSURF
L182	Ө	6.090	4.850	.496	-.007	.80	44P	SMOOTHNESS, PARKER PRINTSURF
L122	#	6.668	5.424	1.300	.122	1.61	44P	SMOOTHNESS, PARKER PRINTSURF
GMEANS:		5.683	4.566			1.00		

95% ELLIPSE: 1.224 .485 WITH GAMMA = 35 DEGREES

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS 145-1 TABLE 1
SMOOTHNESS, SHEFFIELD UNITS
TAPPI USEFUL TEST METHOD UM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

	SAMPLE	VELLUM ENVELOPE				SAMPLE	OFFSET PRINTING				TEST D. = 15		
LAB	A84	91 GRAMS PER SQUARE METER				A83	94 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	232.7	4.9	.48	7.3	.89	117.2	9.7	1.02	13.2	1.16	45S	0	L100
L107	223.0	-4.8	-.46	5.6	.68	127.3	19.8	2.09	8.2	.72	45S	*	L107
L108	218.6	-9.2	-.89	4.5	.55	107.5	.0	.01	6.6	.58	45S	0	L108
L114	233.2	5.4	.53	8.7	1.06	123.4	15.9	1.67	15.3	1.35	45S	0	L114
L115	223.3	-4.4	-.43	7.2	.88	102.3	-5.2	-.54	8.2	.72	45S	0	L115
L121	210.0	-17.8	-1.73	7.6	.92	90.3	-17.2	-1.80	7.9	.69	45S	0	L121
L122	234.7	7.0	.68	7.2	.88	110.9	3.4	.36	13.1	1.15	45S	0	L122
L123	231.0	3.2	.31	13.5	1.65	99.4	-8.1	-.85	11.5	1.01	45S	0	L123
L124	212.3	-15.4	-1.50	6.4	.78	92.9	-14.6	-1.53	8.4	.74	45S	0	L124
L125	228.0	.2	.02	9.8	1.19	109.0	1.5	.16	17.6	1.55	45S	0	L125
L126	242.5	14.8	1.44	6.9	.85	116.9	9.4	.99	5.8	.51	45S	0	L126
L128	228.0	.2	.02	10.1	1.24	101.0	-6.5	-.68	7.4	.65	45S	0	L128
L132	236.0	8.2	.80	8.3	1.01	110.5	3.0	.32	11.1	.98	45S	0	L132
L134	232.7	4.9	.48	11.2	1.36	97.7	-9.8	-1.03	9.8	.86	45S	0	L134
L139S	230.3	2.6	.25	5.8	.71	124.2	16.7	1.76	9.9	.87	45S	0	L139S
L148	234.0	6.2	.61	7.7	.94	114.0	6.5	.69	11.3	.99	45S	0	L148
L150	236.8	9.0	.88	8.4	1.02	104.7	-2.8	-.29	7.7	.68	45S	0	L150
L152	230.7	2.9	.28	5.6	.69	114.7	7.2	.76	6.4	.56	45S	0	L152
L153	265.7	37.9	3.69	8.4	1.03	130.5	23.0	2.42	12.4	1.09	45S	X	L153
L157	215.1	-12.7	-1.23	13.2	1.62	102.9	-4.6	-.48	12.4	1.09	45S	0	L157
L158	215.3	-12.4	-1.21	10.6	1.29	91.3	-16.2	-1.70	6.9	.61	45S	0	L158
L159	228.9	1.2	.11	7.9	.97	116.7	9.2	.97	10.1	.89	45S	0	L159
L162	231.3	3.6	.35	8.8	1.07	101.0	-6.5	-.68	13.1	1.15	45S	0	L162
L166	213.1	-14.7	-1.43	6.4	.78	100.1	-7.4	-.78	14.4	1.27	45S	0	L166
L167	234.7	6.9	.67	4.8	.59	117.7	10.2	1.07	10.8	.95	45S	0	L167
L173B	234.7	6.9	.67	6.4	.78	119.0	11.5	1.21	19.6	1.72	45S	0	L173B
L183S	241.7	13.9	1.35	9.6	1.17	115.7	8.2	.86	17.3	1.52	45S	0	L183S
L190C	214.7	-13.1	-1.27	7.9	.97	113.7	6.2	.66	10.0	.88	45S	0	L190C
L190R	205.9	-21.9	-2.13	6.2	.75	91.9	-15.6	-1.64	11.3	.99	45S	0	L190R
L195	222.7	-5.1	-.50	8.0	.98	104.3	-3.2	-.33	9.0	.79	45S	0	L195
L206	217.5	-10.3	-1.00	28.1	3.43	103.5	-4.0	-.42	8.0	.71	45S	0	L206
L211	223.9	-3.9	-.38	11.4	1.39	98.4	-9.1	-.96	6.9	.61	45S	0	L211
L213	203.7	-24.0	-2.34	6.0	.73	92.3	-15.2	-1.60	12.3	1.08	45S	0	L213
L219	233.7	5.9	.57	5.5	.67	114.7	7.2	.76	8.8	.77	45S	0	L219
L223	235.9	8.2	.79	8.6	1.05	101.1	-6.4	-.67	21.2	1.87	45S	0	L223
L224	239.0	11.2	1.09	7.1	.87	113.5	6.0	.64	9.7	.85	45S	0	L224
L226B	220.7	-7.1	-.69	10.2	1.24	111.9	4.4	.47	10.6	.93	45S	0	L226B
L228	239.9	12.1	1.18	9.0	1.10	106.9	-.6	-.06	15.2	1.34	45S	0	L228
L230S	227.0	-.8	-.07	7.5	.92	115.7	8.2	.86	9.6	.84	45S	0	L230S
L231	240.5	12.8	1.24	8.8	1.07	108.7	1.2	.12	18.2	1.60	45S	0	L231
L233	231.0	3.2	.31	7.1	.87	111.4	3.9	.41	11.2	.99	45S	0	L233
L237	235.7	7.9	.77	3.2	.39	104.7	-2.8	-.30	9.0	.79	45S	0	L237
L241	204.9	-22.8	-2.22	9.4	1.15	98.0	-9.5	-1.00	5.4	.47	45S	0	L241
L249	225.7	-2.1	-.20	8.0	.98	100.7	-6.8	-.71	13.5	1.18	45S	0	L249
L254	238.3	10.5	1.02	7.1	.87	99.2	-8.3	-.87	6.4	.56	45S	0	L254
L255	218.7	-9.0	-.88	6.5	.79	106.8	-.7	-.07	9.2	.81	45S	0	L255
L259	256.0	28.2	2.75	5.1	.62	119.3	11.8	1.25	13.1	1.15	45S	*	L259
L260	218.7	-9.0	-.88	6.7	.82	117.1	9.6	1.01	12.9	1.13	45S	0	L260
L261	227.8	.0	.00	7.6	.93	113.6	6.1	.64	13.0	1.14	45S	0	L261
L262	226.7	-1.1	-.11	6.2	.75	103.3	-4.2	-.44	6.7	.59	45S	0	L262
L275	232.0	4.2	.41	7.7	.95	102.7	-4.8	-.51	14.5	1.27	45S	0	L275
L277	249.3	21.6	2.10	7.4	.91	97.9	-9.6	-1.00	5.8	.51	45S	*	L277
L278	243.7	15.9	1.55	7.2	.88	128.3	20.8	2.19	10.3	.90	45S	0	L278
L281	228.5	.7	.07	6.7	.82	103.5	-4.0	-.42	16.9	1.48	45S	0	L281
L285	224.5	-3.3	-.32	8.1	1.00	118.5	11.0	1.15	13.5	1.18	45S	0	L285
L288	227.2	-.6	-.05	8.1	.98	120.7	13.2	1.39	16.7	1.47	45S	0	L288
L290	203.3	-24.4	-2.38	6.8	.83	102.9	-4.6	-.48	15.3	1.34	45S	0	L290
L291S	237.2	9.4	.92	5.1	.63	112.2	4.7	.50	13.7	1.20	45S	0	L291S
L305	221.1	-6.7	-.65	6.3	.77	95.5	-12.0	-1.26	9.0	.79	45S	0	L305
L308	224.4	-3.4	-.33	6.7	.82	97.7	-9.8	-1.03	16.8	1.48	45S	0	L308
L312	266.3	38.5	3.74	5.8	.70	176.3	68.8	7.24	12.7	1.12	45S	#	L312
L317	225.3	-2.4	-.24	8.3	1.02	103.7	-3.8	-.40	12.9	1.13	45S	0	L317
L318	232.4	4.6	.45	7.1	.87	120.3	12.8	1.35	15.5	1.36	45S	0	L318
L321	217.3	-10.4	-1.01	8.0	.98	89.0	-18.5	-1.94	6.3	.56	45S	0	L321
L323	240.7	12.9	1.25	8.2	1.00	123.0	15.5	1.63	11.6	1.02	45S	0	L323

ANALYSIS 145-1 TABLE 1
SMOOTHNESS, SHEFFIELD UNITS
TAPPI USEFUL TEST METHOD UM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	SAMPLE A84 MEAN	VELLUM ENVELOPE 91 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	SAMPLE A83 MEAN	OFFSET PRINTING 94 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	TEST D. = 15 VAR	F	LAB
L326	215.8	-12.0	-1.16	6.7	.82	107.0	-.5	-.05	9.3	.82	455	0	L326
L328	234.9	7.2	.70	10.8	1.32	95.6	-11.9	-1.25	7.3	.64	455	0	L328
L348	230.1	2.3	.22	10.0	1.22	102.4	-5.1	-.53	7.6	.67	455	0	L348
L349	219.6	-8.2	-.79	10.1	1.23	111.1	3.6	.38	13.1	1.15	455	0	L349
L352	233.7	5.9	.57	6.1	.75	108.3	.8	.09	10.5	.92	455	0	L352
L360	227.0	-.8	-.07	6.2	.76	107.8	.3	.03	13.1	1.15	455	0	L360
L366	235.5	7.8	.76	8.5	1.04	103.7	-3.8	-.40	12.1	1.06	455	0	L366
L376	231.3	3.6	.35	8.3	1.02	113.3	5.8	.62	9.9	.87	455	0	L376
L380	218.0	-9.8	-.95	5.3	.64	101.3	-6.2	-.65	3.5	.31	455	0	L380
L382	239.0	11.2	1.09	7.2	.88	112.7	5.2	.55	14.4	1.27	455	0	L382
L554	219.3	-8.5	-.83	8.4	1.02	87.7	-19.8	-2.08	10.9	.96	455	0	L554
L562	234.9	7.2	.70	6.1	.75	101.1	-6.4	-.67	15.0	1.32	455	0	L562
L567	215.6	-12.2	-1.18	9.0	1.10	124.5	17.0	1.79	27.3	2.40	455	*	L567
L571	230.0	2.2	.22	10.0	1.22	116.0	8.5	.90	18.4	1.62	455	0	L571
L575	241.1	13.3	1.29	6.7	.82	120.6	13.1	1.38	17.0	1.49	455	0	L575
L585	230.3	2.6	.25	9.9	1.21	99.7	-7.8	-.82	9.0	.79	455	0	L585
L600	234.3	6.6	.64	8.6	1.05	111.5	4.0	.42	7.5	.66	455	0	L600
L604	222.7	-5.1	-.50	7.0	.86	89.3	-18.2	-1.91	8.2	.72	455	0	L604
L626	232.0	4.2	.41	5.9	.72	103.2	-4.3	-.45	10.7	.94	455	0	L626
L636	224.9	-2.8	-.28	6.8	.84	114.5	7.0	.73	11.2	.98	455	0	L636
L651	228.8	1.0	.10	12.1	1.48	107.5	.0	.01	15.3	1.34	455	0	L651
L670	243.7	15.9	1.55	9.2	1.12	112.9	5.4	.57	11.2	.98	455	0	L670
L698	230.5	2.8	.27	9.7	1.18	103.8	-3.7	-.39	14.1	1.24	455	0	L698
L702	208.7	-19.1	-1.86	9.3	1.14	100.7	-6.8	-.72	13.3	1.17	455	0	L702
L704	224.3	-3.4	-.33	8.6	1.05	111.3	3.8	.40	14.9	1.31	455	0	L704
L729	228.0	.2	.02	5.9	.72	115.7	8.2	.86	9.3	.82	455	0	L729
L738	216.7	-11.1	-1.08	16.3	1.99	95.3	-12.2	-1.28	5.2	.45	455	0	L738

GR. MEAN = 227.8 SHEFF. UNITS   GRAND MEAN = 107.5 SHEFF. UNITS   TEST DETERMINATIONS = 15
SD MEANS = 10.3 SHEFF. UNITS   SD OF MEANS = 9.5 SHEFF. UNITS   90 LABS IN GRAND MEANS
AVERAGE SDR = 8.2 SHEFF. UNITS   AVERAGE SDR = 11.4 SHEFF. UNITS
TOTAL NUMBER OF LABORATORIES REPORTING = 92

Best values: A84 230 ± 16 Sheffield units
A83 107 ± 15 Sheffield units

The following laboratories were omitted from the grand means because of extreme test results: 312

ANALYSIS 145-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
TAPPI USEFUL TEST METHOD UM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

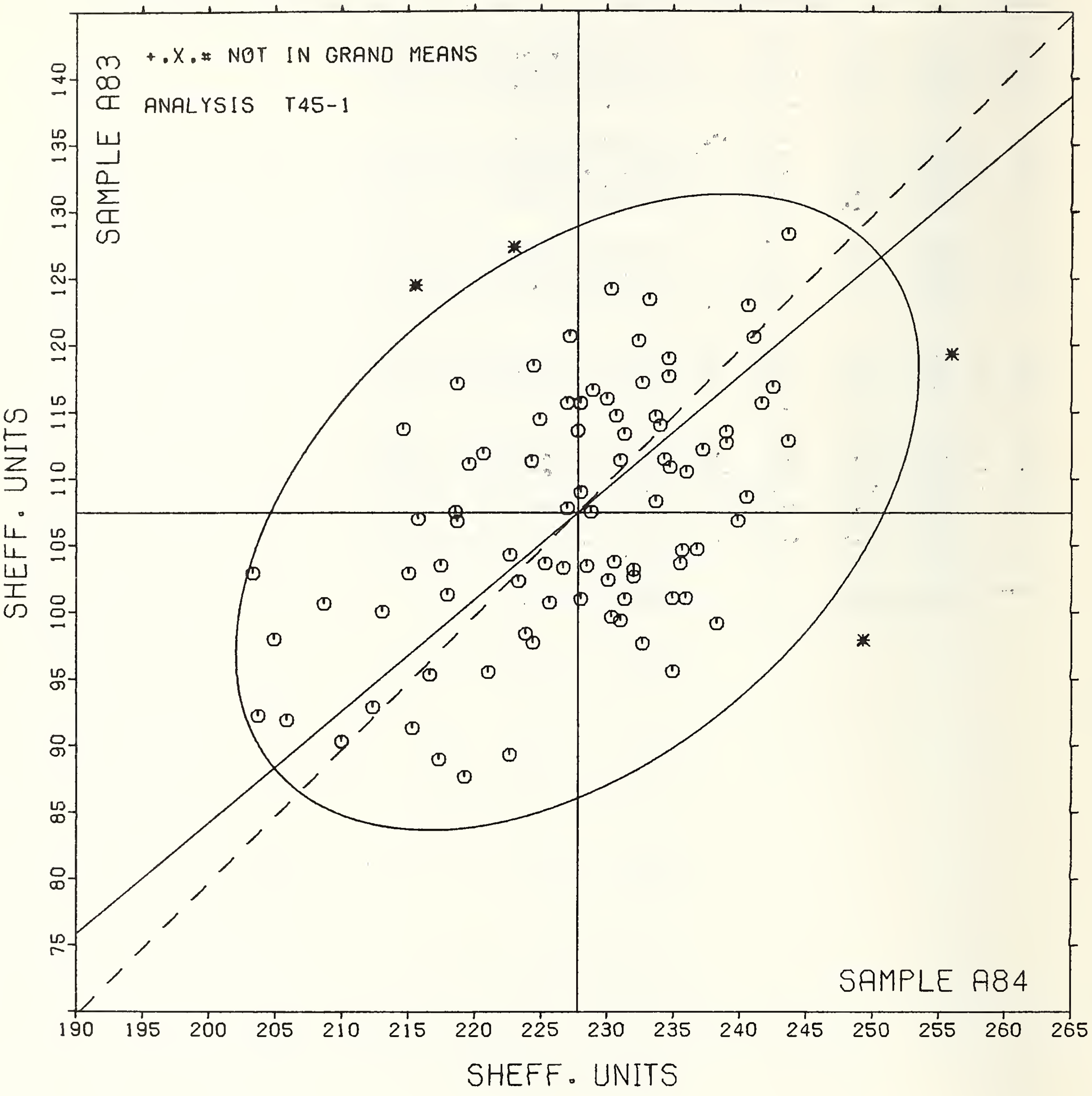
LAB		MEANS		COORDINATES		AVG		
CODE	F	A84	A83	MAJOR	MINOR	R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L290	0	203.3	102.9	-21.7	12.2	1.08	45S	SMOOTHNESS, SHEFFIELD
L213	0	203.7	92.3	-28.2	3.8	.91	45S	SMOOTHNESS, SHEFFIELD
L241	0	204.9	98.0	-23.6	7.4	.81	45S	SMOOTHNESS, SHEFFIELD
L190R	0	205.9	91.9	-26.8	2.1	.87	45S	SMOOTHNESS, SHEFFIELD
L702	0	208.7	100.7	-19.0	7.0	1.16	45S	SMOOTHNESS, SHEFFIELD
L121	0	210.0	90.3	-24.6	-1.7	.81	45S	SMOOTHNESS, SHEFFIELD
L124	0	212.3	92.9	-21.2	-1.3	.76	45S	SMOOTHNESS, SHEFFIELD
L166	0	213.1	100.1	-16.0	3.7	1.02	45S	SMOOTHNESS, SHEFFIELD
L190C	0	214.7	113.7	-6.0	13.2	.92	45S	SMOOTHNESS, SHEFFIELD
L157	0	215.1	102.9	-12.7	4.7	1.36	45S	SMOOTHNESS, SHEFFIELD
L158	0	215.3	91.3	-19.9	-4.4	.95	45S	SMOOTHNESS, SHEFFIELD
L567	*	215.6	124.5	1.6	20.8	1.75	45S	SMOOTHNESS, SHEFFIELD
L326	0	215.8	107.0	-9.5	7.3	.82	45S	SMOOTHNESS, SHEFFIELD
L738	0	216.7	95.3	-16.3	-2.2	1.22	45S	SMOOTHNESS, SHEFFIELD
L321	0	217.3	89.0	-19.9	-7.5	.77	45S	SMOOTHNESS, SHEFFIELD
L206	0	217.5	103.5	-10.4	3.6	2.07	45S	SMOOTHNESS, SHEFFIELD
L380	0	218.0	101.3	-11.4	1.6	.48	45S	SMOOTHNESS, SHEFFIELD
L108	0	218.6	107.5	-7.0	5.9	.56	45S	SMOOTHNESS, SHEFFIELD
L260	0	218.7	117.1	-.7	13.2	.97	45S	SMOOTHNESS, SHEFFIELD
L255	0	218.7	106.8	-7.4	5.3	.80	45S	SMOOTHNESS, SHEFFIELD
L554	0	219.3	87.7	-19.2	-9.7	.99	45S	SMOOTHNESS, SHEFFIELD
L349	0	219.6	111.1	-3.9	8.0	1.19	45S	SMOOTHNESS, SHEFFIELD
L226B	0	220.7	111.9	-2.6	8.0	1.08	45S	SMOOTHNESS, SHEFFIELD
L305	0	221.1	95.5	-12.8	-4.9	.78	45S	SMOOTHNESS, SHEFFIELD
L604	0	222.7	89.3	-15.6	-10.6	.79	45S	SMOOTHNESS, SHEFFIELD
L195	0	222.7	104.3	-5.9	.9	.88	45S	SMOOTHNESS, SHEFFIELD
L107	*	223.0	127.3	9.1	18.3	.70	45S	SMOOTHNESS, SHEFFIELD
L115	0	223.3	102.3	-6.7	-1.1	.80	45S	SMOOTHNESS, SHEFFIELD
L211	0	223.9	98.4	-8.8	-4.5	1.00	45S	SMOOTHNESS, SHEFFIELD
L704	0	224.3	111.3	-.2	5.2	1.18	45S	SMOOTHNESS, SHEFFIELD
L308	0	224.4	97.7	-8.8	-5.3	1.15	45S	SMOOTHNESS, SHEFFIELD
L285	0	224.5	118.5	4.5	10.5	1.09	45S	SMOOTHNESS, SHEFFIELD
L636	0	224.9	114.5	2.3	7.2	.91	45S	SMOOTHNESS, SHEFFIELD
L317	0	225.3	103.7	-4.3	-1.4	1.08	45S	SMOOTHNESS, SHEFFIELD
L249	0	225.7	100.7	-5.9	-3.8	1.08	45S	SMOOTHNESS, SHEFFIELD
L262	0	226.7	103.3	-3.5	-2.5	.67	45S	SMOOTHNESS, SHEFFIELD
L360	0	227.0	107.8	-.4	.7	.95	45S	SMOOTHNESS, SHEFFIELD
L230S	0	227.0	115.7	4.7	6.8	.88	45S	SMOOTHNESS, SHEFFIELD
L288	0	227.2	120.7	8.0	10.5	1.23	45S	SMOOTHNESS, SHEFFIELD
L261	0	227.8	113.6	4.0	4.7	1.03	45S	SMOOTHNESS, SHEFFIELD
L729	0	228.0	115.7	5.4	6.1	.77	45S	SMOOTHNESS, SHEFFIELD
L128	0	228.0	101.0	-4.0	-5.1	.94	45S	SMOOTHNESS, SHEFFIELD
L125	0	228.0	109.0	1.2	1.0	1.37	45S	SMOOTHNESS, SHEFFIELD
L281	0	228.5	103.5	-2.0	-3.5	1.15	45S	SMOOTHNESS, SHEFFIELD
L651	0	228.8	107.5	.8	-.6	1.41	45S	SMOOTHNESS, SHEFFIELD
L159	0	228.9	116.7	6.8	6.3	.93	45S	SMOOTHNESS, SHEFFIELD
L571	0	230.0	116.0	7.2	5.1	1.42	45S	SMOOTHNESS, SHEFFIELD
L348	0	230.1	102.4	-1.5	-5.4	.95	45S	SMOOTHNESS, SHEFFIELD
L585	0	230.3	99.7	-3.0	-7.6	1.00	45S	SMOOTHNESS, SHEFFIELD
L139S	0	230.3	124.2	12.7	11.2	.79	45S	SMOOTHNESS, SHEFFIELD
L698	0	230.5	103.8	-.2	-4.6	1.21	45S	SMOOTHNESS, SHEFFIELD
L152	0	230.7	114.7	6.9	3.7	.62	45S	SMOOTHNESS, SHEFFIELD
L233	0	231.0	111.4	5.0	.9	.93	45S	SMOOTHNESS, SHEFFIELD
L123	0	231.0	99.4	-2.7	-8.3	1.33	45S	SMOOTHNESS, SHEFFIELD
L376	0	231.3	113.3	6.5	2.2	.94	45S	SMOOTHNESS, SHEFFIELD
L162	0	231.3	101.0	-1.4	-7.3	1.11	45S	SMOOTHNESS, SHEFFIELD
L275	0	232.0	102.7	.2	-6.4	1.11	45S	SMOOTHNESS, SHEFFIELD
L626	0	232.0	103.2	.5	-6.0	.83	45S	SMOOTHNESS, SHEFFIELD
L318	0	232.4	120.3	11.8	6.9	1.11	45S	SMOOTHNESS, SHEFFIELD
L134	0	232.7	97.7	-2.5	-10.7	1.11	45S	SMOOTHNESS, SHEFFIELD
L100	0	232.7	117.2	10.0	4.3	1.03	45S	SMOOTHNESS, SHEFFIELD
L114	0	233.2	123.4	14.4	8.7	1.20	45S	SMOOTHNESS, SHEFFIELD
L219	0	233.7	114.7	9.1	1.7	.72	45S	SMOOTHNESS, SHEFFIELD
L352	0	233.7	108.3	5.1	-3.1	.83	45S	SMOOTHNESS, SHEFFIELD
L148	0	234.0	114.0	9.0	1.0	.97	45S	SMOOTHNESS, SHEFFIELD

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS 145-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
TAPPI USEFUL TEST METHOD UM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	F	MEANS A84	A83	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L600	0	234.3	111.5	7.6	-1.2	.86	45S	SMOOTHNESS, SHEFFIELD
L173B	0	234.7	119.0	12.7	4.4	1.25	45S	SMOOTHNESS, SHEFFIELD
L167	0	234.7	117.7	11.8	3.4	.77	45S	SMOOTHNESS, SHEFFIELD
L122	0	234.7	110.9	7.5	-1.9	1.02	45S	SMOOTHNESS, SHEFFIELD
L328	0	234.9	95.6	-2.1	-13.7	.96	45S	SMOOTHNESS, SHEFFIELD
L562	0	234.9	101.1	1.4	-9.5	1.03	45S	SMOOTHNESS, SHEFFIELD
L366	0	235.5	103.7	3.5	-7.9	1.05	45S	SMOOTHNESS, SHEFFIELD
L237	0	235.7	104.7	4.3	-7.2	.59	45S	SMOOTHNESS, SHEFFIELD
L223	0	235.9	101.1	2.1	-10.2	1.46	45S	SMOOTHNESS, SHEFFIELD
L132	0	236.0	110.5	8.3	-2.9	.99	45S	SMOOTHNESS, SHEFFIELD
L150	0	236.8	104.7	5.2	-7.9	.86	45S	SMOOTHNESS, SHEFFIELD
L291S	0	237.2	112.2	10.3	-2.4	.92	45S	SMOOTHNESS, SHEFFIELD
L254	0	238.3	99.2	2.7	-13.1	.71	45S	SMOOTHNESS, SHEFFIELD
L224	0	239.0	113.5	12.5	-2.6	.06	45S	SMOOTHNESS, SHEFFIELD
L382	0	239.0	112.7	11.9	-3.2	1.07	45S	SMOOTHNESS, SHEFFIELD
L228	0	239.9	106.9	8.9	-8.2	1.22	45S	SMOOTHNESS, SHEFFIELD
L231	0	240.5	108.7	10.6	-7.3	1.34	45S	SMOOTHNESS, SHEFFIELD
L323	0	240.7	123.0	19.9	3.6	1.01	45S	SMOOTHNESS, SHEFFIELD
L575	0	241.1	120.6	18.6	1.5	1.16	45S	SMOOTHNESS, SHEFFIELD
L183S	0	241.7	115.7	15.9	-2.7	1.34	45S	SMOOTHNESS, SHEFFIELD
L126	0	242.5	116.9	17.3	-2.3	.68	45S	SMOOTHNESS, SHEFFIELD
L278	0	243.7	128.3	25.6	5.8	.89	45S	SMOOTHNESS, SHEFFIELD
L670	0	243.7	112.9	15.7	-6.1	1.05	45S	SMOOTHNESS, SHEFFIELD
L277	*	249.3	97.9	10.4	-21.2	.71	45S	SMOOTHNESS, SHEFFIELD
L259	*	256.0	119.3	29.3	-9.0	.88	45S	SMOOTHNESS, SHEFFIELD
L153	X	265.7	130.5	43.8	-6.7	1.06	45S	SMOOTHNESS, SHEFFIELD
L312	#	266.3	176.3	73.7	28.1	.91	45S	SMOOTHNESS, SHEFFIELD
GMEANS:		227.8	107.5			1.00		
		95% ELLIPSE:		29.8	18.5	WITH GAMMA = 39 DEGREES		

SMOOTHNESS, SHEFFIELD

SAMPLE A84 = 228. SHEFF. UNITS SAMPLE A83 = 107. SHEFF. UNITS



REPORT NO. 63G

JANUARY 1980

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS 745-2 TABLE 1
SMOOTHNESS, BEKK SECONDS
TAPPI SUGGESTED METHOD T479 SU-71, SMOOTHNESS OF PAPER (BEKK METHOD)

LAB	SAMPLE A84	VELLUM ENVELOPE 91 GRAMS PER SQUARE METER				SAMPLE A83	OFFSET PRINTING 94 GRAMS PER SQUARE METER				TEST D. = 15		
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L139B	14.52	1.47	1.60	1.02	1.22	53.87	-1.07	-.15	7.75	.84	45K	0	L139B
L162	13.09	.04	.05	.88	1.05	42.87	-12.07	-1.64	4.82	.52	45K	0	L162
L182K	12.35	-.70	-.76	.50	.59	50.80	-4.13	-.56	8.06	.87	45K	0	L182K
L190C	13.76	.71	.77	1.44	1.72	70.20	15.27	2.07	13.14	1.42	45K	0	L190C
L230B	11.47	-1.59	-1.73	.52	.62	51.73	-3.20	-.43	11.07	1.20	45K	0	L230B
L243K	12.98	-.07	-.08	.54	.64	59.00	4.07	.55	6.43	.69	45K	0	L243K
L291K	12.59	-.46	-.50	.69	.83	56.20	1.27	.17	10.81	1.17	45K	0	L291K
L564	12.80	-.25	-.28	.68	.81	50.39	-4.55	-.62	9.67	1.05	45K	0	L564
L581	14.27	1.21	1.33	1.49	1.78	61.13	6.20	.84	8.85	.96	45K	0	L581
L697	12.69	-.37	-.40	.63	.76	53.15	-1.78	-.24	11.86	1.28	45K	0	L697

GR. MEAN = 13.05 BEKK SECONDS GRAND MEAN = 54.93 BEKK SECONDS TEST DETERMINATIONS = 15

SD MEANS = .92 BEKK SECONDS SD OF MEANS = 7.36 BEKK SECONDS 10 LABS IN GRAND MEANS

AVERAGE SDR = .84 BEKK SECONDS AVERAGE SDR = 9.25 BEKK SECONDS

L250M	12.80	-.25	-.28	.86	1.03	42.80	-12.13	-1.65	11.79	1.28	45L	*	L250M
L251	13.28	.23	.25	.65	.78	48.07	-6.87	-.93	13.70	1.48	45L	*	L251

TOTAL NUMBER OF LABORATORIES REPORTING = 12

Best values: A84 13 Bekk seconds
A83 55 Bekk seconds

REPORT NO. 63G

JANUARY 1980

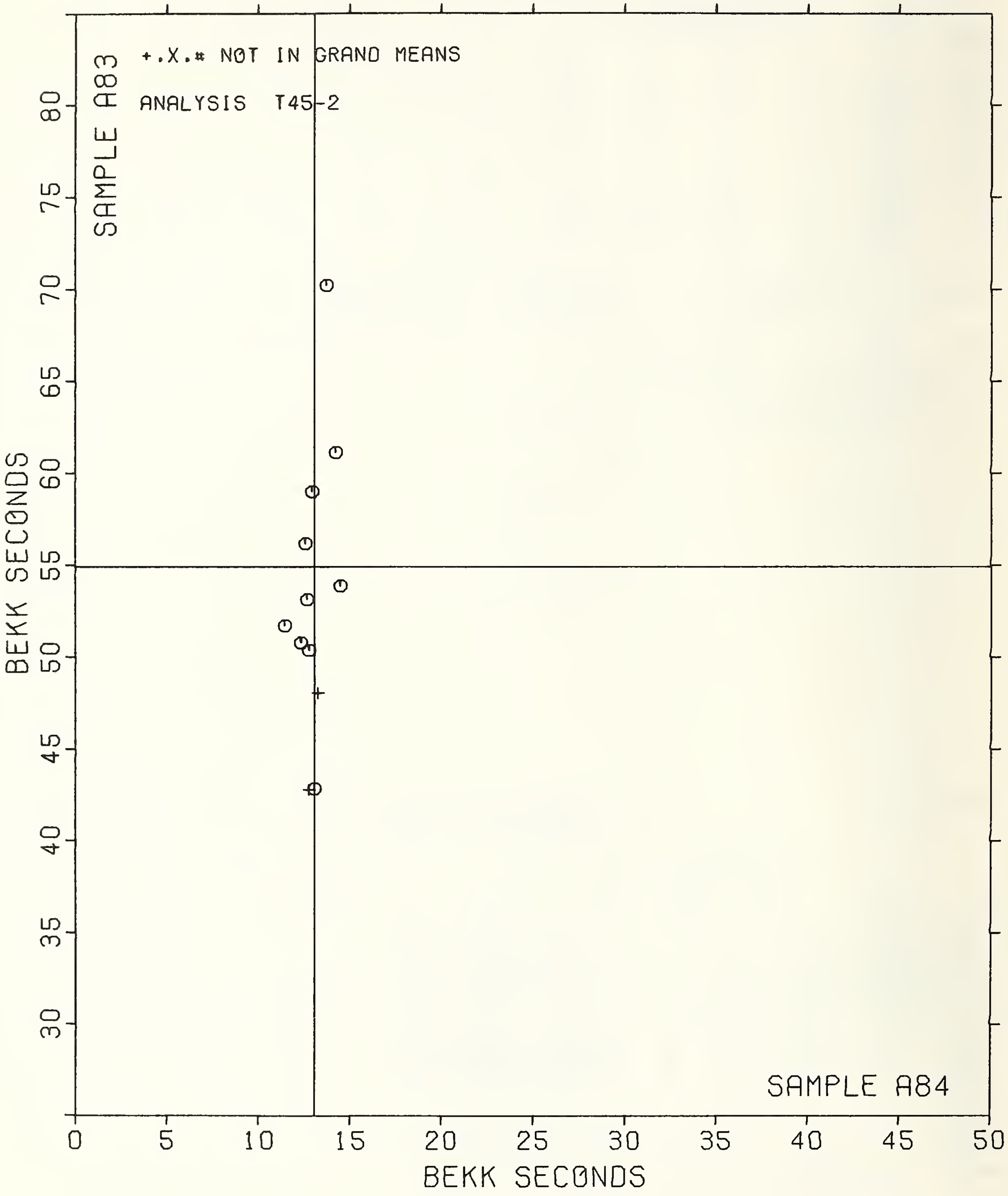
TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS 745-2 TABLE 2
SMOOTHNESS, BEKK SECONDS
TAPPI SUGGESTED METHOD T479 SU-71, SMOOTHNESS OF PAPER (BEKK METHOD)

LAB		MEANS		COORDINATES		AVG		
CODE	F	A84	A83	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L230B	0	11.47	51.73	-3.28	1.42	.91	45K	SMOOTHNESS, BEKK
L182K	0	12.35	50.80	-4.16	.48	.73	45K	SMOOTHNESS, BEKK
L291K	0	12.59	56.20	1.24	.52	1.00	45K	SMOOTHNESS, BEKK
L697	0	12.69	53.15	-1.80	.27	1.02	45K	SMOOTHNESS, BEKK
L250M	*	12.80	42.80	-12.13	-.38	1.15	45L	SMOOTHNESS, BEKK, 20 C, 65% RH
L564	0	12.80	50.39	-4.55	.01	.93	45K	SMOOTHNESS, BEKK
L243K	0	12.98	59.00	4.06	.28	.67	45K	SMOOTHNESS, BEKK
L162	0	13.09	42.87	-12.05	-.67	.78	45K	SMOOTHNESS, BEKK
L251	*	13.28	48.07	-6.85	-.59	1.13	45L	SMOOTHNESS, BEKK, 20 C, 65% RH
L190C	0	13.76	70.20	15.28	.09	1.57	45K	SMOOTHNESS, BEKK
L581	0	14.27	61.13	6.25	-.89	1.37	45K	SMOOTHNESS, BEKK
L139B	0	14.52	53.87	-.99	-1.52	1.03	45K	SMOOTHNESS, BEKK
GMEANS:		13.05	54.93			1.00		

95% ELLIPSE: 23.35 2.64 WITH GAMMA = 87 DEGREES

SMOOTHNESS, BEKK

SAMPLE A84 = 13.1 BEKK SECONDS SAMPLE A83 = 54.9 BEKK SECONDS



REPORT NO. 63G TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 147-1 TABLE 1

SMOOTHNESS, BENDTSEN (MILLILITERS/MINUTE)

TAPPI USEFUL TEST METHOD UM 535, SMOOTHNESS OF PAPER AND PAPERBOARD (BENDTSEN TESTER)

LAB CODE	SAMPLE A84 MEAN	VELLUM ENVELOPE 91 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE A83 MEAN	OFFSET PRINTING 94 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L100	336.	-3.	-.13	25.	1.00	116.	5.	.22	12.	.81	47B	0	L100
L182B	377.	37.	1.36	40.	1.59	150.	38.	1.81	18.	1.20	47B	0	L182B
L242	321.	-19.	-.70	18.	.70	106.	-5.	-.26	22.	1.41	47B	0	L242
L243B	364.	24.	.88	35.	1.39	110.	-2.	-.09	20.	1.33	47B	0	L243B
L244	353.	13.	.48	28.	1.12	110.	-2.	-.08	17.	1.09	47B	0	L244
L280	364.	24.	.88	29.	1.13	89.	-22.	-1.06	15.	1.00	47B	0	L280
L313	331.	-9.	-.33	38.	1.52	100.	-11.	-.53	14.	.89	47B	0	L313
L333	311.	-28.	-1.04	15.	.60	137.	25.	1.19	22.	1.46	47B	0	L333
L484	357.	17.	.63	13.	.49	130.	18.	.86	9.	.59	47B	0	L484
L685	340.	1.	.02	13.	.50	104.	-8.	-.37	12.	.78	47B	0	L685
L739	283.	-56.	-2.07	24.	.96	76.	-36.	-1.69	7.	.46	47B	0	L739

GR. MEAN = 340. ML/MIN GRAND MEAN = 112. ML/MIN TEST DETERMINATIONS = 10

SD MEANS = 27. ML/MIN SD OF MEANS = 21. ML/MIN 11 LABS IN GRAND MEANS

AVERAGE SDR = 25. ML/MIN AVERAGE SDR = 15. ML/MIN

TOTAL NUMBER OF LABORATORIES REPORTING = 11

Best values: A84 340 ± 55 milliliter per minute
A83 115 ± 35 milliliter per minute

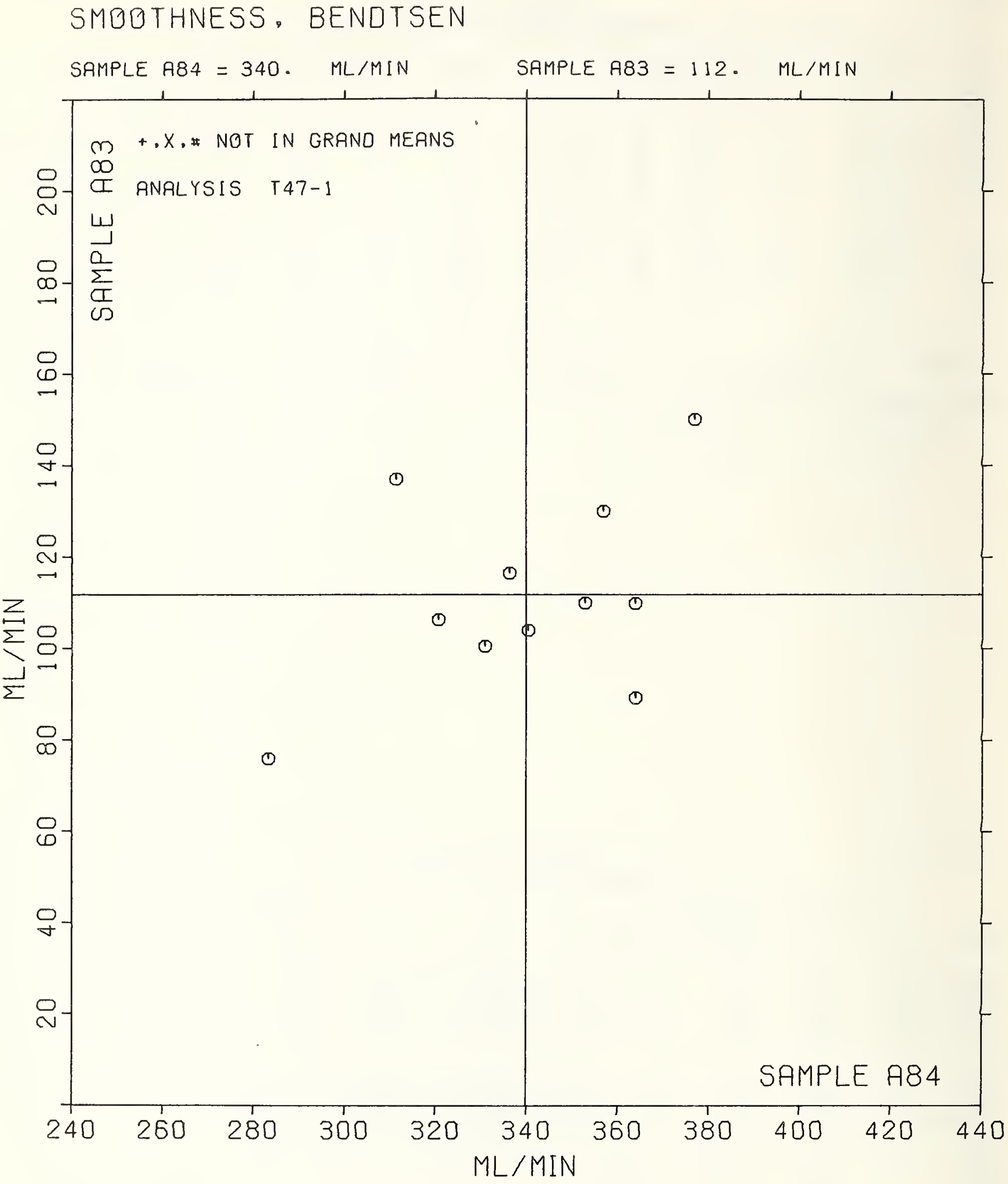
REPORT NO. 63G TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 147-1 TABLE 2

SMOOTHNESS, BENDTSEN (MILLILITERS/MINUTE)

TAPPI USEFUL TEST METHOD UM 535, SMOOTHNESS OF PAPER AND PAPERBOARD (BENDTSEN TESTER)

LAB CODE	F	MEANS A84	A83	COORDINATES MAJOR	MINOR	AVG R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L739	0	283.	76.	-67.	-3.	.71	47B	SMOOTHNESS, BENDTSEN, WG 150
L333	0	311.	137.	-12.	36.	1.03	47B	SMOOTHNESS, BENDTSEN, WG 150
L242	0	321.	106.	-19.	5.	1.06	47B	SMOOTHNESS, BENDTSEN, WG 150
L313	0	331.	100.	-13.	-5.	1.20	47B	SMOOTHNESS, BENDTSEN, WG 150
L100	0	336.	116.	-1.	6.	.91	47B	SMOOTHNESS, BENDTSEN, WG 150
L685	0	340.	104.	-3.	-7.	.64	47B	SMOOTHNESS, BENDTSEN, WG 150
L244	0	353.	110.	10.	-8.	1.10	47B	SMOOTHNESS, BENDTSEN, WG 150
L484	0	357.	130.	24.	7.	.54	47B	SMOOTHNESS, BENDTSEN, WG 150
L243B	0	364.	110.	20.	-14.	1.36	47B	SMOOTHNESS, BENDTSEN, WG 150
L280	0	364.	89.	10.	-32.	1.06	47B	SMOOTHNESS, BENDTSEN, WG 150
L182B	0	377.	150.	51.	14.	1.39	47B	SMOOTHNESS, BENDTSEN, WG 150
GMEANS:		340.	112.			1.00		
		95% ELLIPSE:		92.	53.	WITH GAMMA = 30 DEGREES		


SMOOTHNESS, BENDTSEN
SAMPLE A84 = 340. ML/MIN
SAMPLE A83 = 112. ML/MIN
+,X,* NOT IN GRAND MEANS
ANALYSIS T47-1
SAMPLE A83
ML/MIN
200
180
160
140
120
100
80
60
40
20
SAMPLE A84
240
260
280
300
320
340
360
380
400
420
440
ML/MIN

REPORT NO. 630 TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 153-1 TABLE 1
MOISTURE IN PAPER, PERCENT
TAPPI SUGGESTED METHOD T412 SU-69

	SAMPLE	KRAFT WRAPPING				SAMPLE	BLEACHED KRAFT ENVELOPE				TEST NO. = 10		
LAB	E66	83 GRAMS PER SQUARE METER				G32	106 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L134	5.98	-.10	-.17	.10	.73	5.73	.17	.39	.07	.38	53M	O	L134
L141	6.68	.60	1.07	.07	.47	5.99	.43	.99	.09	.53	53D	O	L141
L162	5.40	-.68	-1.21	.16	1.16	NO DATA REPORTED FOR SAMPLE G32					53M	M	L162
L213	6.48	.40	.72	.22	1.56	5.94	.38	.87	.05	.29	53M	O	L213
L244	6.26	.18	.33	.07	.52	5.73	.17	.40	.19	1.07	53D	O	L244
L291	6.10	.02	.04	.10	.71	5.87	.31	.71	.29	1.62	53D	O	L291
L376	5.78	-.30	-.53	.33	2.30	4.95	-.61	-1.40	.40	2.26	53D	O	L376
L442	6.06	-.02	-.03	.14	1.01	5.30	-.26	-.60	.27	1.50	53D	O	L442
L570	5.11	-.96	-1.72	.25	1.75	5.19	-.37	-.85	.21	1.16	53D	O	L570
L571	6.16	.08	.15	.22	1.54	6.76	1.20	2.76	.10	.54	53M	#	L571
L592	5.35	-.73	-1.30	.11	.76	5.01	-.55	-1.27	.10	.56	53M	O	L592
L729	7.08	1.00	1.79	.06	.45	6.21	.65	1.50	.15	.86	53D	O	L729
L739	5.96	-.12	-.21	.10	.74	5.24	-.32	-.74	.14	.77	53P	O	L739

GRD MEAN = 6.08 PERCENT GRAND MEAN = 5.56 PERCENT TEST DETERMINATIONS = 10
SD MEANS = .56 PERCENT SD OF MEANS = .43 PERCENT 11 LABS IN GRAND MEANS
AVERAGE SDR = .14 PERCENT AVERAGE SDR = .18 PERCENT

L100	6.39	.31	.56	.09	.62	5.83	.27	.62	.05	.27	53X	*	L100

TOTAL NUMBER OF LABORATORIES REPORTING = 14

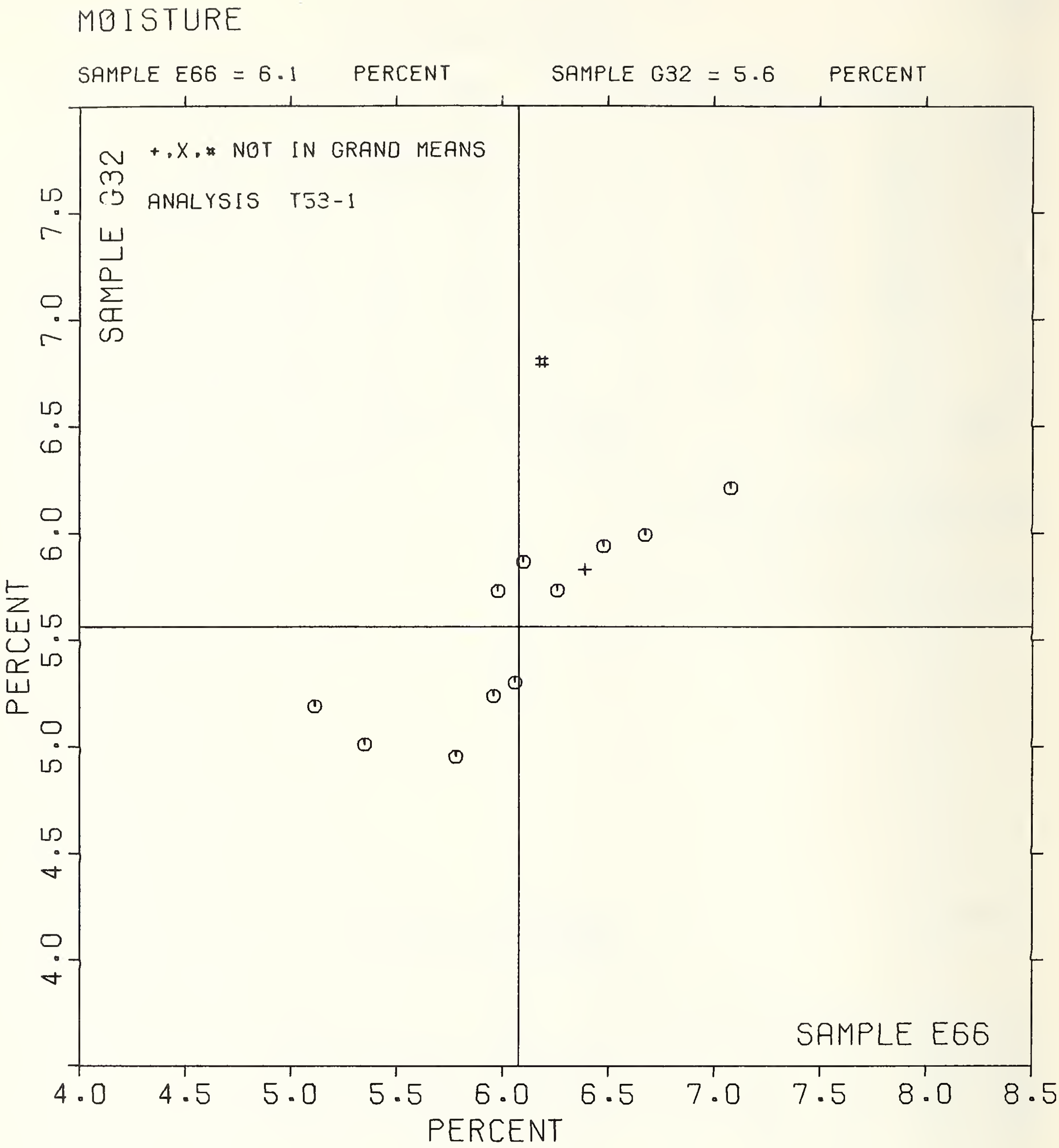
Best values: E66 6.1 ± 0.9 percent
G32 5.6 ± 0.6 percent

The following laboratories were omitted from the grand means because of extreme test results: 571

REPORT NO. 630 TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 153-1 TABLE 2
MOISTURE IN PAPER, PERCENT
TAPPI SUGGESTED METHOD T412 SU-69

LAB		MEANS		COORDINATES		AVG		
CODE	F	E66	G32	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L570	O	5.11	5.19	-.99	.28	1.45	53D	MOISTURE CONTENT, OVEN DRYING METHOD
L592	O	5.35	5.01	-.91	-.01	.66	53M	MOISTURE CONTENT, MOISTREX
L162	M	5.40				1.16	53M	MOISTURE CONTENT, MOISTREX
L376	O	5.78	4.95	-.60	-.31	2.28	53D	MOISTURE CONTENT, OVEN DRYING METHOD
L739	O	5.96	5.24	-.29	-.19	.76	53P	MOISTURE CONTENT, HOT PLATE/DESICCATOR
L134	O	5.98	5.73	.02	.19	.56	53M	MOISTURE CONTENT, MOISTREX
L442	O	6.06	5.30	-.17	-.20	1.25	53D	MOISTURE CONTENT, OVEN DRYING METHOD
L291	O	6.10	5.87	.20	.23	1.16	53D	MOISTURE CONTENT, OVEN DRYING METHOD
L571	#	6.16	6.76	.78	.91	1.04	53M	MOISTURE CONTENT, MOISTREX
L244	O	6.26	5.73	.25	.03	.79	53D	MOISTURE CONTENT, OVEN DRYING METHOD
L100	*	6.39	5.83	.41	.03	.45	53X	MOISTURE CONTENT: DESCRIBE METHOD
L213	O	6.48	5.94	.55	.06	.92	53M	MOISTURE CONTENT, MOISTREX
L141	O	6.68	5.99	.74	-.01	.50	53D	MOISTURE CONTENT, OVEN DRYING METHOD
L729	O	7.08	6.21	1.19	-.08	.65	53D	MOISTURE CONTENT, OVEN DRYING METHOD
GMEANS:		6.08	5.56			1.00		
		95% ELLIPSE:		2.10	.57	WITH GAMMA = 36 DEGREES		


MOISTURE
SAMPLE E66 = 6.1 PERCENT
SAMPLE G32 = 5.6 PERCENT
+,X,* NOT IN GRAND MEANS
ANALYSIS T53-1
SAMPLE G32
PERCENT
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
SAMPLE E66
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
PERCENT

REPORT NO. 63G TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 156-1 TABLE 1

K & N INK ABSORPTION

TAPPI USEFUL TEST METHOD UM 553, PRINTING INK METHOD AND BRITISH STANDARD 4574-70

LAB	SAMPLE E44 COATED GLOSS 150 GRAMS PER SQUARE METER					SAMPLE G03 HEAT SET OFFSET BOOK 76 GRAMS PER SQUARE METER					TEST D. = 4		
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L126	29.5	-.1	-.02	.3	.46	58.0	.5	.08	.3	.57	56K	0	L126
L149	31.0	1.4	.35	.8	1.28	55.0	-2.5	-.40	.0	.00	56K	0	L149
L182	35.3	5.8	1.40	.1	.09	62.6	5.1	.82	.2	.27	56K	0	L182
L277	29.1	-.4	-.11	.9	1.34	64.9	7.4	1.19	1.0	1.72	56K	0	L277
L291	24.8	-4.7	-1.15	1.7	2.70	62.1	4.6	.74	.6	1.03	56K	0	L291
L333	28.2	-1.4	-.34	.5	.73	51.0	-6.5	-1.05	1.2	1.92	56K	0	L333
L337	24.1	-5.4	-1.32	.4	.67	47.1	-10.3	-1.67	.6	1.00	56K	0	L337
L339	33.2	3.7	.89	.5	.78	65.7	8.3	1.33	1.0	1.60	56K	0	L339
L616	25.2	-4.3	-1.05	.5	.78	54.5	-3.0	-.48	.6	.96	56K	0	L616
L643	35.1	5.6	1.35	.7	1.17	54.1	-3.4	-.55	.6	.93	56K	0	L643

GR. MEAN = 29.6 K & N UNITS GRAND MEAN = 57.5 K & N UNITS TEST DETERMINATIONS = 4

SD MEANS = 4.1 K & N UNITS SD OF MEANS = 6.2 K & N UNITS 10 LABS IN GRAND MEANS

AVERAGE SDR = .6 K & N UNITS AVERAGE SDR = .6 K & N UNITS

TOTAL NUMBER OF LABORATORIES REPORTING = 10

Best values: E44 30 K&N units
G03 57 K&N units

REPORT NO. 63G TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 156-1 TABLE 2

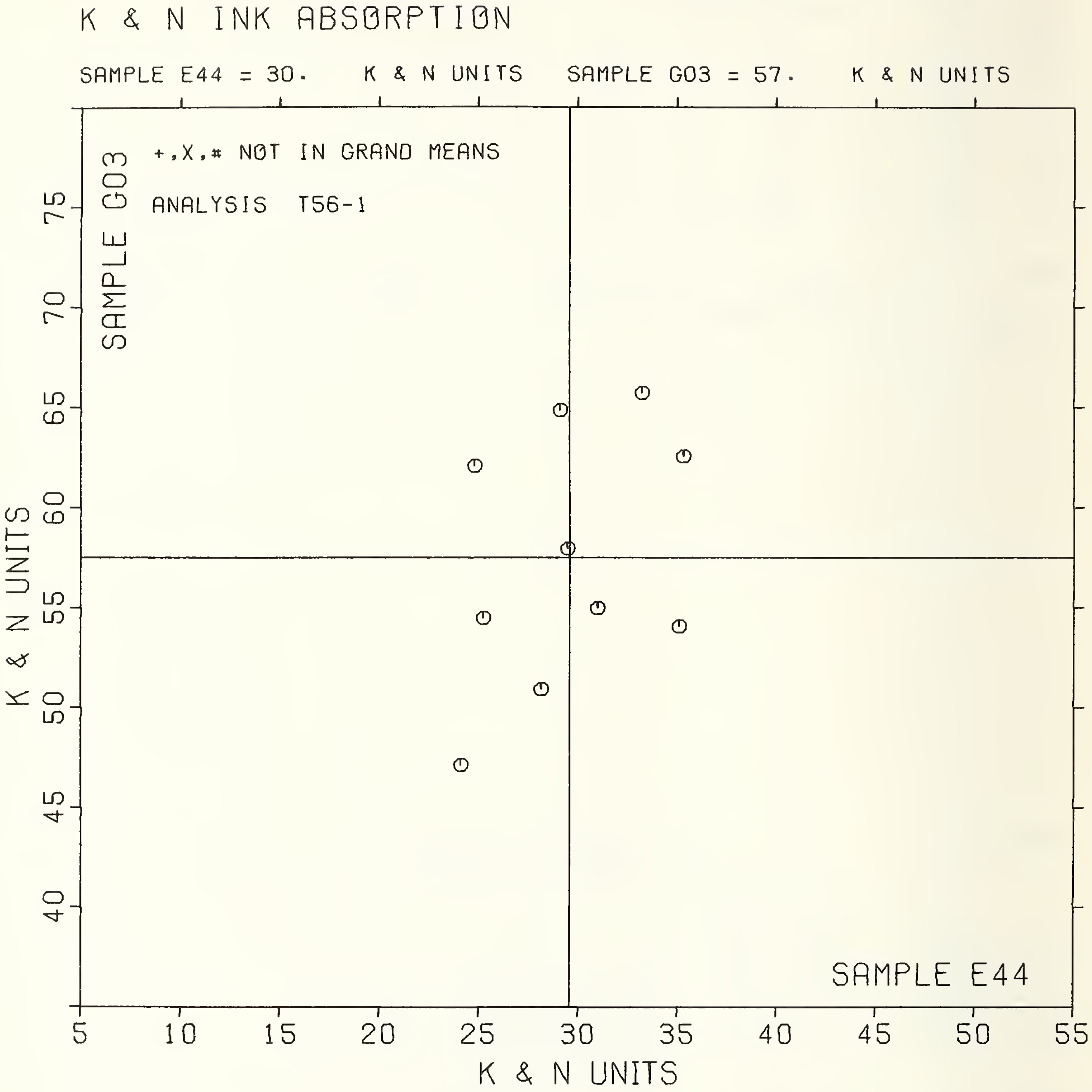
K & N INK ABSORPTION

TAPPI USEFUL TEST METHOD UM 553, PRINTING INK METHOD AND BRITISH STANDARD 4574-70

LAB		MEANS		COORDINATES		AVG		
CODE	F	E44	G03	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L337	0	24.1	47.1	-11.6	1.3	.83	56K	INK ABSORPTION, K&N INK TEST
L291	0	24.8	62.1	2.5	6.1	1.87	56K	INK ABSORPTION, K&N INK TEST
L616	0	25.2	54.5	-4.4	2.9	.87	56K	INK ABSORPTION, K&N INK TEST
L333	0	28.2	51.0	-6.6	-1.1	1.33	56K	INK ABSORPTION, K&N INK TEST
L277	0	29.1	64.9	6.7	3.1	1.53	56K	INK ABSORPTION, K&N INK TEST
L126	0	29.5	58.0	.4	.2	.51	56K	INK ABSORPTION, K&N INK TEST
L149	0	31.0	55.0	-1.8	-2.2	.64	56K	INK ABSORPTION, K&N INK TEST
L339	0	33.2	65.7	9.0	-.4	1.19	56K	INK ABSORPTION, K&N INK TEST
L643	0	35.1	54.1	-1.1	-6.4	1.05	56K	INK ABSORPTION, K&N INK TEST
L182	0	35.3	62.6	6.9	-3.5	.18	56K	INK ABSORPTION, K&N INK TEST

GMEANS: 29.6 57.5 1.00

95% ELLIPSE: 20.6 11.4 WITH GAMMA = 68 DEGREES


K & N INK ABSORPTION
SAMPLE E44 = 30. K & N UNITS
SAMPLE G03 = 57. K & N UNITS
+,X,* NOT IN GRAND MEANS
ANALYSIS T56-1
SAMPLE G03
SAMPLE E44
K & N UNITS
K & N UNITS
5
10
15
20
25
30
35
40
45
50
55
40
45
50
55
60
65
70
75

ANALYSIS 160-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS

TAPPI OFFICIAL TEST METHOD T425 OS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

	SAMPLE G22	M.F. RELEASE PAPER 73 GRAMS PER SQUARE METER				SAMPLE G26	OFFSET WHITE BOOK 72 GRAMS PER SQUARE METER				TEST D. = 10		
LAB CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L105	87.22	1.52	2.08	.55	.57	88.24	-.01	-.02	.49	.51	60H	*	L105
L108	86.62	.92	1.26	.71	.74	87.54	-.71	-.98	.47	.49	60B	0	L108
L115	86.50	.80	1.10	1.02	1.06	88.93	.68	.93	.44	.46	60B	0	L115
L118	84.91	-.79	-1.07	1.33	1.37	88.64	.39	.53	.70	.72	60B	0	L118
L122	85.37	-.33	-.44	1.69	1.74	88.67	.42	.57	1.10	1.14	60D	0	L122
L123	86.20	.50	.69	1.40	1.45	88.17	-.08	-.12	1.07	1.11	60W	0	L123
L124	86.96	1.26	1.73	.67	.69	89.27	1.02	1.39	1.28	1.34	60B	0	L124
L125	86.40	.70	.96	.82	.85	88.31	.06	.08	1.59	1.66	60B	0	L125
L132	84.83	-.87	-1.18	1.36	1.40	88.30	.05	.06	1.10	1.14	60B	0	L132
L139	85.33	-.37	-.50	.44	.46	88.02	-.23	-.32	1.40	1.45	60B	0	L139
L148H	84.42	-1.28	-1.74	.54	.56	87.14	-1.11	-1.53	1.18	1.22	60B	0	L148H
L152	86.01	.31	.43	.60	.62	89.06	.81	1.10	.86	.90	60B	0	L152
L157	86.20	.50	.69	1.48	1.53	89.65	1.40	1.91	1.13	1.18	60B	0	L157
L158	85.54	-.16	-.21	1.87	1.94	88.58	.33	.45	.74	.77	60D	0	L158
L162	86.39	.69	.95	.96	1.00	88.93	.68	.93	.59	.62	60W	0	L162
L166	84.87	-.83	-1.13	.79	.82	87.89	-.36	-.50	1.04	1.08	60B	0	L166
L173A	85.34	-.36	-.48	.64	.66	88.02	-.23	-.32	.86	.90	60B	0	L173A
L190C	85.06	-.64	-.87	1.23	1.27	86.86	-1.39	-1.91	1.08	1.13	60B	0	L190C
L190R	85.92	.22	.31	.95	.99	87.13	-1.12	-1.54	1.09	1.14	60B	0	L190R
L206	85.28	-.42	-.57	1.15	1.19	88.07	-.18	-.25	.99	1.03	60B	0	L206
L210B	86.69	.99	1.36	1.10	1.13	88.68	.43	.58	1.17	1.22	60B	0	L210B
L210D	86.14	.44	.61	1.04	1.08	87.54	-.71	-.98	.82	.85	60D	0	L210D
L211S	84.98	-.72	-.98	.68	.71	88.44	.19	.25	1.27	1.32	60R	0	L211S
L212	85.66	-.04	-.05	.98	1.02	88.71	.46	.62	1.41	1.46	60H	0	L212
L213	85.67	-.03	-.03	.52	.53	89.09	.84	1.15	.77	.80	60B	0	L213
L223B	86.69	.99	1.36	.63	.65	89.06	.81	1.10	.84	.87	60B	0	L223B
L225	86.62	.92	1.26	.42	.44	88.72	.47	.64	1.10	1.14	60E	0	L225
L226B	85.30	-.40	-.54	1.24	1.28	87.87	-.38	-.53	.69	.72	60B	0	L226B
L228	84.47	-1.23	-1.67	1.13	1.16	87.44	-.81	-1.12	1.25	1.30	60B	0	L228
L230	85.78	.08	.12	.98	1.01	88.37	.12	.16	.79	.83	60B	0	L230
L238A	84.76	-.94	-1.28	.58	.60	87.13	-1.12	-1.54	.56	.58	60F	0	L238A
L241	85.88	.18	.25	.78	.81	87.52	-.73	-1.01	1.35	1.41	60B	0	L241
L243	85.27	-.43	-.58	1.23	1.27	87.80	-.45	-.62	1.10	1.14	60E	0	L243
L254	85.50	-.20	-.27	1.24	1.28	87.33	-.92	-1.27	.88	.91	60F	0	L254
L259	85.70	.00	.01	.79	.82	88.30	.05	.06	1.11	1.16	60B	0	L259
L262	85.67	-.03	-.03	.48	.50	89.95	1.70	2.33	.49	.51	60F	*	L262
L275	85.69	-.01	-.01	1.08	1.12	88.62	.37	.50	.27	.28	60F	0	L275
L278	85.58	-.12	-.16	1.14	1.18	87.77	-.48	-.67	1.06	1.10	60B	0	L278
L285D	84.86	-.84	-1.14	1.76	1.81	87.42	-.83	-1.15	1.64	1.71	60D	0	L285D
L285R	85.46	-.24	-.32	.80	.83	88.20	-.05	-.08	1.10	1.14	60R	0	L285R
L288	85.50	-.20	-.27	.66	.68	87.56	-.69	-.95	1.10	1.14	60D	0	L288
L308	86.54	.84	1.15	.77	.79	88.66	.41	.56	1.03	1.07	60H	0	L308
L317	85.61	-.09	-.12	.49	.51	87.74	-.51	-.71	.72	.75	60B	0	L317
L323	86.75	1.05	1.44	.88	.91	89.09	.84	1.15	.61	.64	60W	0	L323
L339	85.30	-.40	-.54	1.34	1.38	88.60	.35	.47	1.07	1.12	60B	0	L339
L341	84.79	-.91	-1.23	.58	.60	87.96	-.29	-.40	.64	.67	60F	0	L341
L348	84.80	-.90	-1.22	1.51	1.56	88.19	-.06	-.09	1.01	1.05	60D	0	L348
L349	85.45	-.25	-.33	1.05	1.09	88.05	-.20	-.28	.94	.98	60D	0	L349
L354	84.47	-1.23	-1.67	1.24	1.28	87.66	-.59	-.82	1.25	1.30	60B	0	L354
L366	85.60	-.10	-.13	1.24	1.28	89.18	.93	1.27	.80	.83	60B	0	L366
L554	85.79	.09	.13	.83	.86	87.57	-.68	-.94	1.14	1.18	60B	0	L554
L567	85.22	-.48	-.65	1.10	1.14	87.63	-.62	-.86	.71	.74	60D	0	L567
L571	86.53	.83	1.14	.51	.52	88.95	.70	.95	1.04	1.08	60D	0	L571
L573	86.12	.42	.58	1.25	1.29	88.70	.45	.61	.83	.86	60B	0	L573
L581	85.90	.20	.28	.98	1.01	88.66	.41	.56	.85	.88	60B	0	L581
L592	82.55	-3.15	-4.29	1.69	1.75	86.46	-1.79	-2.46	1.27	1.32	60W	#	L592
L608	88.12	2.42	3.31	1.22	1.26	90.87	2.62	3.59	1.16	1.21	60D	X	L608
L636	85.98	.28	.39	.80	.83	88.59	.34	.46	1.01	1.05	60F	0	L636
L654	86.59	.89	1.22	1.00	1.04	89.43	1.18	1.61	.75	.78	60D	0	L654
L673R	85.61	-.09	-.12	.62	.64	87.55	-.70	-.97	.48	.50	60B	0	L673R
L673T	85.49	-.21	-.28	.43	.45	87.49	-.76	-1.05	.92	.96	60B	0	L673T
L692	85.66	-.04	-.05	.73	.76	88.67	.42	.57	.92	.96	60D	0	L692
L698	84.01	-1.69	-2.30	1.32	1.36	86.74	-1.51	-2.08	1.00	1.05	60D	0	L698
L712	87.65	1.95	2.67	.94	.98	89.75	1.50	2.05	1.38	1.44	60B	*	L712

GR. MEAN = 85.70 PERCENT
SD MEANS = .73 PERCENT
AVERAGE SDR = .97 PERCENT

GRAND MEAN = 88.25 PERCENT
SD OF MEANS = .73 PERCENT
AVERAGE SDR = .96 PERCENT

TEST DETERMINATIONS = 10
62 LABS IN GRAND MEANS

ANALYSIS 160-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS

TAPPI OFFICIAL TEST METHOD T425 OS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

	SAMPLE	M.F. RELEASE PAPER				SAMPLE	OFFSET WHITE BOOK				TEST D. = 10		
LAB	G22	73 GRAMS PER SQUARE METER				G26	72 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	86.05	.35	.48	1.30	1.34	88.22	-.03	-.05	.57	.59	60E	+	L100
L219	88.91	3.21	4.39	.95	.98	90.98	2.73	3.74	.30	.31	60E	+	L219
L224	85.53	-.17	-.23	.96	.99	88.13	-.12	-.17	.93	.96	60P	+	L224
L249	81.57	-4.13	-5.63	1.21	1.25	85.55	-2.70	-3.71	.82	.85	60P	+	L249
L256	86.46	.77	1.05	1.02	1.05	88.45	.19	.26	.96	1.00	60N	+	L256
L277	85.50	-.20	-.27	.91	.94	87.65	-.60	-.83	1.20	1.25	60P	+	L277
L312	82.60	-3.10	-4.22	.52	.53	86.20	-2.05	-2.82	.63	.66	60P	+	L312
L380	84.80	-.90	-1.22	.79	.82	87.60	-.65	-.90	.52	.54	60P	+	L380
L564	84.50	-1.20	-1.63	.85	.88	87.80	-.45	-.62	.92	.96	60P	+	L564
L685B	84.69	-1.01	-1.37	.90	.94	87.57	-.68	-.94	.59	.61	60P	+	L685B
L702	85.15	-.55	-.74	.82	.85	86.05	-2.20	-3.03	.83	.87	60P	+	L702
L704	84.80	-.90	-1.22	.35	.36	88.00	-.25	-.35	.35	.37	60P	+	L704
L706	86.28	.58	.80	.96	1.00	89.24	.99	1.35	.63	.65	60X	+	L706
L738	90.03	4.33	5.91	.94	.97	85.12	-3.13	-4.30	.42	.43	60X	+	L738

TOTAL NUMBER OF LABORATORIES REPORTING = 78

Best values: G22 85.6 ± 1.1 percent
G26 88.2 ± 1.1 percent

The following laboratories were omitted from the grand means because of extreme test results: 592

ANALYSIS T60-1 TABLE 2
OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS
TAPPI OFFICIAL TEST METHOD T425 OS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

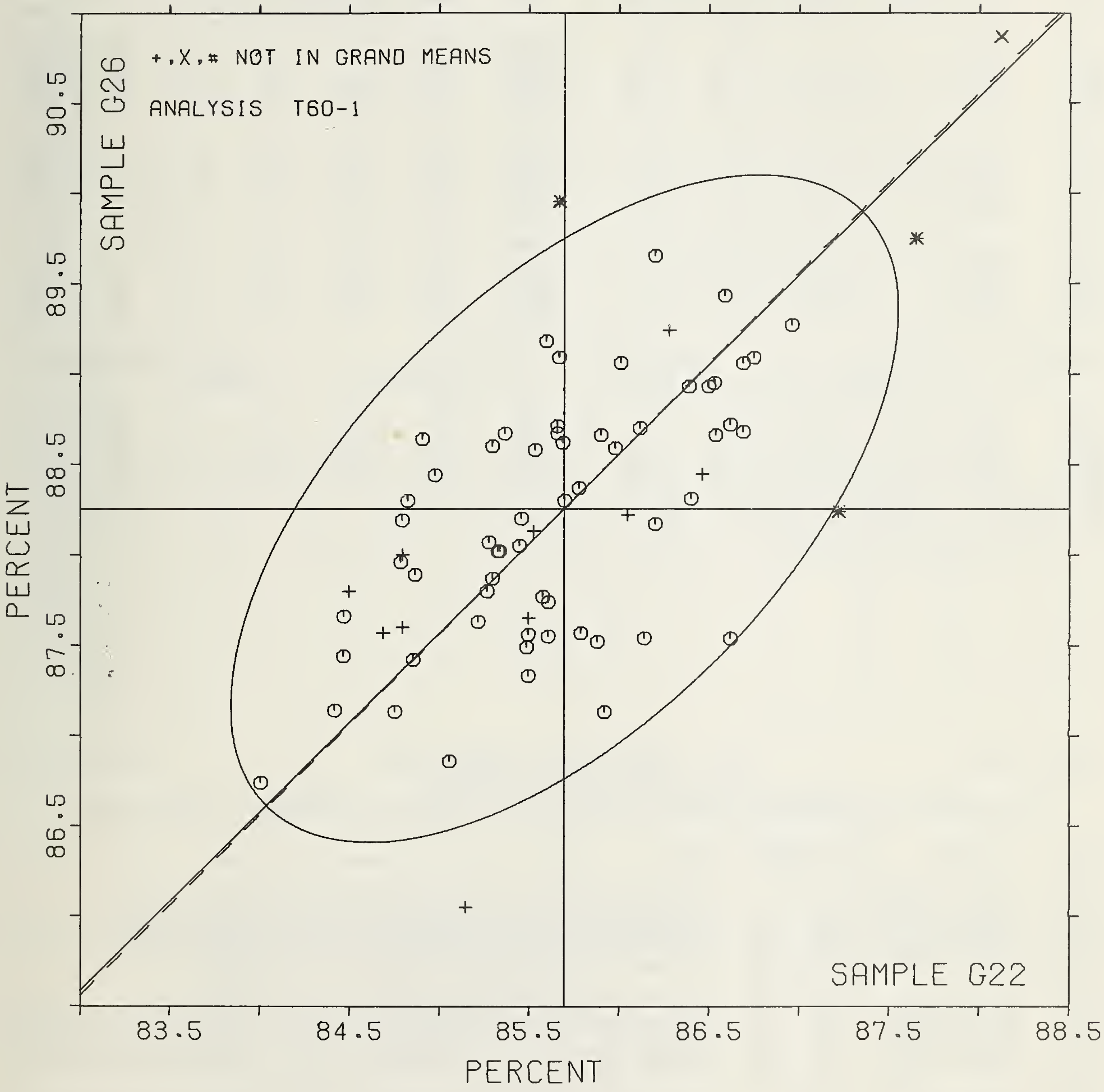
LAB		MEANS		COORDINATES		AVG		
CODE	F	G22	G26	MAJOR	MINOR	R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L249	+	81.57	85.55	-4.83	.98	1.05	60P	OPACITY (WHITE BACKING)82 TO 95%, PHOTOVOLT
L592	#	82.55	86.46	-3.50	.94	1.53	60W	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN,DIGITAL
L312	+	82.60	86.20	-3.65	.72	.60	60P	OPACITY (WHITE BACKING)82 TO 95%, PHOTOVOLT
L698	O	84.01	86.74	-2.26	.11	1.20	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L148H	O	84.42	87.14	-1.69	.11	.89	60H	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN
L354	O	84.47	87.66	-1.29	.44	1.29	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L228	O	84.47	87.44	-1.44	.28	1.23	60H	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN
L564	+	84.50	87.80	-1.17	.52	.92	60P	OPACITY (WHITE BACKING)82 TO 95%, PHOTOVOLT
L685B	+	84.69	87.57	-1.20	.22	.77	60P	OPACITY (WHITE BACKING)82 TO 95%, PHOTOVOLT
L238A	O	84.76	87.13	-1.46	-.14	.59	60R	OPACITY (WHITE BACKING)82 TO 95%, THWING-ALBERT (WAS SRL)
L341	O	84.79	87.96	-.85	.43	.63	60R	OPACITY (WHITE BACKING)82 TO 95%, THWING-ALBERT (WAS SRL)
L704	+	84.80	88.00	-.82	.45	.36	60P	OPACITY (WHITE BACKING)82 TO 95%, PHOTOVOLT
L380	+	84.80	87.60	-1.10	.16	.68	60P	OPACITY (WHITE BACKING)82 TO 95%, PHOTOVOLT
L348	O	84.80	88.19	-.68	.58	1.30	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L132	O	84.83	88.30	-.58	.64	1.27	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L285D	O	84.86	87.42	-1.18	-.01	1.76	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L166	O	84.87	87.89	-.84	.32	.95	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L118	O	84.91	88.64	-.29	.83	1.05	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L211S	O	84.98	88.44	-.38	.63	1.01	60R	OPACITY (WHITE BACKING)82 TO 95%, THWING-ALBERT (WAS SRL)
L190C	O	85.06	86.86	-1.43	-.54	1.20	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L702	+	85.15	86.05	-1.94	-1.18	.86	60P	OPACITY (WHITE BACKING)82 TO 95%, PHOTOVOLT
L567	O	85.22	87.63	-.78	-.11	.94	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L243	O	85.27	87.80	-.62	-.02	1.21	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L206	O	85.28	88.07	-.43	.16	1.11	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L339	O	85.30	88.60	-.04	.52	1.25	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L226B	O	85.30	87.87	-.55	.00	1.00	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L139	O	85.33	88.02	-.42	.09	.96	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L173A	O	85.34	88.02	-.42	.08	.78	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L122	O	85.37	88.67	.06	.52	1.44	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L349	O	85.45	88.05	-.32	.03	1.03	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L285R	O	85.46	88.20	-.21	.13	.99	60R	OPACITY (WHITE BACKING)82 TO 95%, THWING-ALBERT (WAS SRL)
L673T	O	85.49	87.49	-.68	-.40	.70	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L277	+	85.50	87.65	-.56	-.29	1.10	60P	OPACITY (WHITE BACKING)82 TO 95%, PHOTOVOLT
L288	O	85.50	87.56	-.63	-.36	.91	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L254	O	85.50	87.33	-.79	-.52	1.10	60H	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN
L224	+	85.53	88.13	-.21	.03	.98	60P	OPACITY (WHITE BACKING)82 TO 95%, PHOTOVOLT
L158	O	85.54	88.58	.12	.34	1.35	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L278	O	85.58	87.77	-.42	-.26	1.14	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L366	O	85.60	89.18	.58	.72	1.06	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L673R	O	85.61	87.55	-.56	-.44	.57	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L317	O	85.61	87.74	-.42	-.31	.63	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L212	O	85.66	88.71	.30	.35	1.24	60H	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN
L692	O	85.66	88.67	.27	.32	.86	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L262	*	85.67	89.95	1.17	1.22	.50	60R	OPACITY (WHITE BACKING)82 TO 95%, THWING-ALBERT (WAS SRL)
L213	O	85.67	89.09	.57	.61	.67	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L275	O	85.69	88.62	.25	.26	.70	60R	OPACITY (WHITE BACKING)82 TO 95%, THWING-ALBERT (WAS SRL)
L259	O	85.70	88.30	.04	.03	.99	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L230	O	85.78	88.37	.14	.02	.92	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L554	O	85.79	87.57	-.41	-.55	1.02	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L241	O	85.88	87.52	-.39	-.65	1.11	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L581	O	85.90	88.66	.43	.14	.95	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L190R	O	85.92	87.13	-.63	-.96	1.06	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L636	O	85.98	88.59	.44	.04	.94	60R	OPACITY (WHITE BACKING)82 TO 95%, THWING-ALBERT (WAS SRL)
L152	O	86.01	89.06	.79	.35	.76	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L100	+	86.05	88.22	.23	-.27	.97	60E	OPACITY (WHITE BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L573	O	86.12	88.70	.62	.02	1.08	60H	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN
L210D	O	86.14	87.54	-.19	-.82	.96	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L157	O	86.20	89.65	1.34	.64	1.35	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L123	O	86.20	88.17	.30	-.42	1.28	60W	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN,DIGITAL
L706	+	86.28	89.24	1.11	.29	.83	60X	OPACITY, 82 TO 95%: GIVE INSTRUMENT MAKE, MODEL, BACKING
L162	O	86.39	88.93	.97	-.01	.81	60W	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN,DIGITAL
L125	O	86.40	88.31	.54	-.46	1.25	60H	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN
L256	+	86.46	88.45	.68	-.41	1.02	60N	OPACITY (WHITE BACKING)82 TO 95%, HUNTER
L115	O	86.50	88.93	1.05	-.09	.76	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L571	O	86.53	88.95	1.08	-.09	.80	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T60-1 TABLE 2
OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS
TAPPI OFFICIAL TEST METHOD T425 OS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB		MEANS		COORDINATES		AVG		
CODE	F	G22	G26	MAJOR	MINOR	R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L308	O	86.54	88.66	.89	-.31	.93	60H	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN
L654	O	86.59	89.43	1.46	.21	.91	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L225	O	86.62	88.72	.98	-.32	.79	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L108	O	86.62	87.54	.15	-1.16	.61	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L223B	O	86.69	89.06	1.27	-.13	.76	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L210B	O	86.69	88.68	1.01	-.40	1.18	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L323	O	86.75	89.09	1.34	-.15	.77	60W	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN,DIGITAL
L124	O	86.96	89.27	1.61	-.17	1.01	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L105	*	87.22	88.24	1.07	-1.08	.54	60H	OPACITY (WHITE BACKING)82 TO 95%, HUYGEN
L712	*	87.65	89.75	2.44	-.31	1.21	60B	OPACITY (WHITE BACKING)82 TO 95%, BAUSCH + LOMB
L608	X	88.12	90.87	3.56	.15	1.23	60D	OPACITY (WHITE BACKING)82 TO 95%, BNL-2
L219	+	88.91	90.98	4.20	-.33	.65	60E	OPACITY (WHITE BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L738	+	90.03	85.12	.87	-5.28	.70	60X	OPACITY, 82 TO 95%: GIVE INSTRUMENT MAKE, MODEL, BACKING
GMEANS:		85.70	88.25			1.00		
		95% ELLIPSE:		2.33	1.19	WITH GAMMA = 44 DEGREES		

OPACITY, B&L, 89% BACKING, FINE P.

SAMPLE G22 = 85.7 PERCENT SAMPLE G26 = 88.3 PERCENT



REPORT NO. 63G TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980
ANALYSIS 160-2 TABLE 1
OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY FINE PAPERS
TAPPI OFFICIAL TEST METHOD T519 OS-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

	SAMPLE	M.F. RELEASE PAPER				SAMPLE	OFFSET WHITE BOOK				TEST D.= 10		
LAB	G22	73 GRAMS PER SQUARE METER				G26	72 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	87.10	.17	.39	1.28	1.41	90.13	-.10	-.24	.53	.72	60J	O	L100
L182E	86.69	-.24	-.56	1.08	1.19	89.90	-.33	-.76	.96	1.29	60J	O	L182E
L219	86.99	.06	.13	.99	1.10	90.73	.50	1.13	.93	1.24	60F	O	L219
L233	86.23	-.70	-1.62	.78	.86	90.20	-.03	-.08	.62	.83	60J	O	L233
L242	87.22	.29	.66	.71	.78	90.66	.43	.97	.61	.82	60J	O	L242
L250T	86.68	-.25	-.58	1.05	1.16	90.07	-.16	-.37	.75	1.01	60J	O	L250T
L251	86.68	-.25	-.57	.84	.93	90.43	.20	.45	.40	.53	60F	O	L251
L309	86.61	-.32	-.74	.70	.77	89.81	-.42	-.96	1.13	1.52	60J	O	L309
L313	87.63	.70	1.61	.71	.79	90.95	.72	1.63	.53	.71	60J	O	L313
L360	86.67	-.26	-.60	1.00	1.10	89.53	-.70	-1.60	1.04	1.39	60F	O	L360
L446	86.55	-.38	-.88	1.06	1.17	90.09	-.14	-.32	.69	.92	60J	O	L446
L575	86.63	-.30	-.70	.85	.93	89.55	-.68	-1.56	.79	1.06	60J	O	L575
L598	87.08	.15	.34	.82	.91	90.23	-.00	-.01	.69	.93	60J	O	L598
L678	87.69	.76	1.74	.93	1.03	90.86	.63	1.43	.76	1.03	60J	O	L678
L685A	87.53	.60	1.38	.81	.89	90.36	.13	.29	.75	1.01	60F	O	L685A

GR. MEAN = 86.93 PERCENT GRAND MEAN = 90.23 PERCENT TEST DETERMINATIONS = 10
SD MEANS = .43 PERCENT SD OF MEANS = .44 PERCENT 15 LABS IN GRAND MEANS
AVERAGE SDR = .91 PERCENT AVERAGE SDR = .74 PERCENT

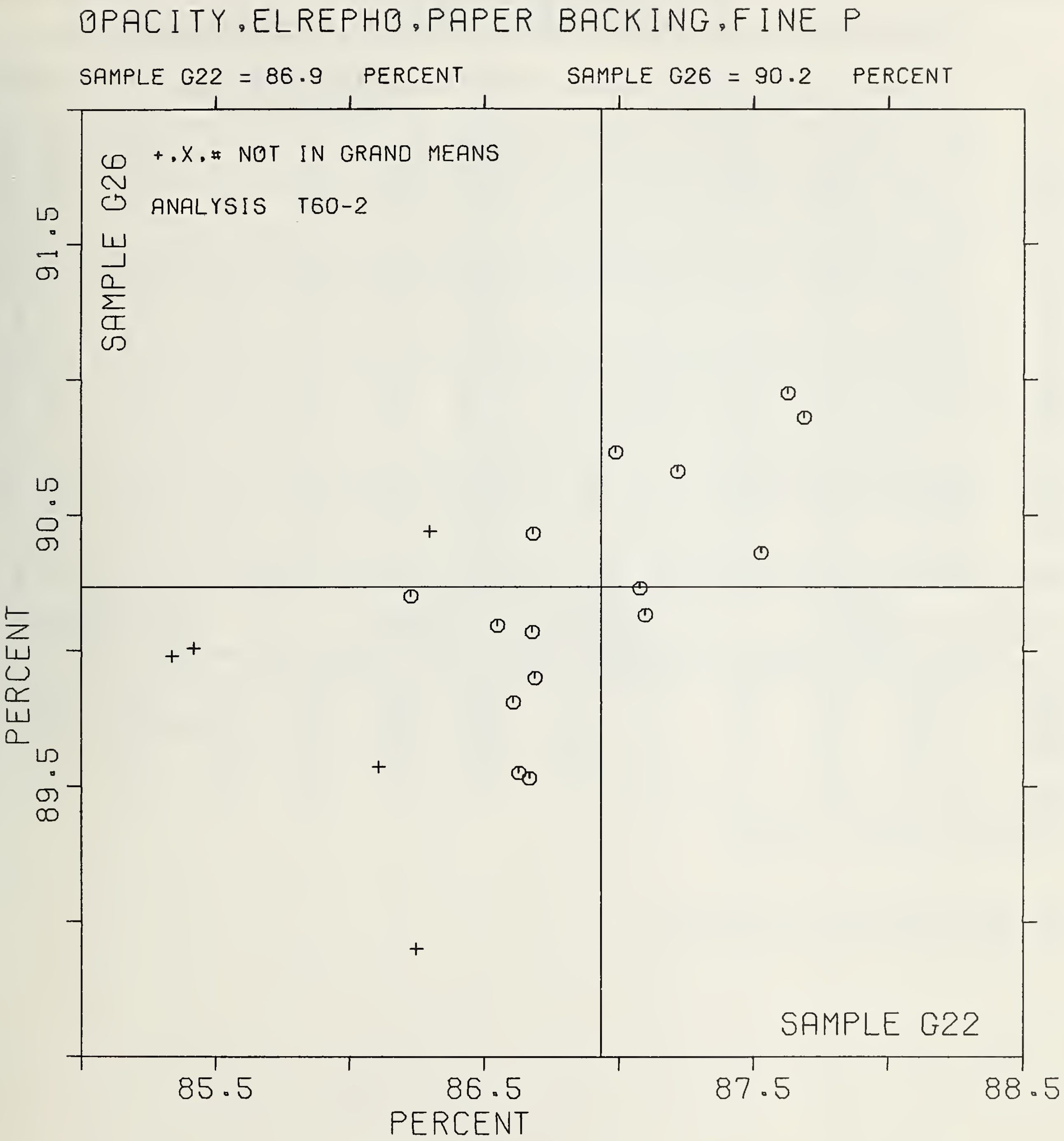
LAB CODE	G22 MEAN	DEV	N.DEV	SDR	R.SDR	G26 MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L118	85.34	-1.59	-3.67	1.11	1.23	89.98	-.25	-.58	.91	1.22	60C	+	L118
L190C	85.42	-1.51	-3.48	1.44	1.59	90.01	-.22	-.51	.71	.96	60C	+	L190C
L190R	86.11	-.82	-1.89	1.15	1.26	89.57	-.66	-1.51	.77	1.04	60C	+	L190R
L243	86.30	-.63	-1.46	.76	.84	90.44	.21	.47	.85	1.15	60C	+	L243
L626	86.25	-.68	-1.57	.82	.91	88.90	-1.33	-3.04	.74	.99	60Q	+	L626

TOTAL NUMBER OF LABORATORIES REPORTING = 20

Best values: G22 86.8 ± 0.8 percent
G26 90.2 ± 0.7 percent

REPORT NO. 63G TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980
ANALYSIS 160-2 TABLE 2
OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY FINE PAPERS
TAPPI OFFICIAL TEST METHOD T519 OS-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB		MEANS		COORDINATES		AVG		
CODE	F	G22	G26	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L118	+	85.34	89.98	-1.30	.96	1.22	60C	OPACITY (PAPER BACKING)82 TO 95%, BAUSCH + LOMB
L190C	+	85.42	90.01	-1.22	.92	1.28	60C	OPACITY (PAPER BACKING)82 TO 95%, BAUSCH + LOMB
L190R	+	86.11	89.57	-1.05	.12	1.15	60C	OPACITY (PAPER BACKING)82 TO 95%, BAUSCH + LOMB
L233	O	86.23	90.20	-.52	.48	.85	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L626	+	86.25	88.90	-1.43	-.45	.95	60Q	OPACITY (PAPER BACKING)82 TO 95%, PHOTOVOLT
L243	+	86.30	90.44	-.30	.60	1.00	60C	OPACITY (PAPER BACKING)82 TO 95%, BAUSCH + LOMB
L446	O	86.55	90.09	-.37	.17	1.04	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L309	O	86.61	89.81	-.53	-.07	1.14	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L575	O	86.63	89.55	-.70	-.26	1.00	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L360	O	86.67	89.53	-.69	-.31	1.25	60F	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10)NO TRAP
L250T	O	86.68	90.07	-.29	.07	1.08	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L251	O	86.68	90.43	-.03	.32	.73	60F	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10)NO TRAP
L182E	O	86.69	89.90	-.41	-.06	1.24	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L219	O	86.99	90.73	.39	.31	1.17	60F	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10)NO TRAP
L598	O	87.08	90.23	.10	-.11	.92	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L100	O	87.10	90.13	.04	-.19	1.06	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L242	O	87.22	90.66	.51	.09	.80	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L685A	O	87.53	90.36	.51	-.34	.95	60F	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10)NO TRAP
L313	O	87.63	90.95	1.00	.01	.75	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
L678	O	87.69	90.86	.98	-.10	1.03	60J	OPACITY (PAPER BACKING)82 TO 95%, Z.ELREPHO,FMY-C(10) FILTER
GMEANS:		86.93	90.23			1.00		
		95% ELLIPSE:		1.63	.69	WITH GAMMA = 45 DEGREES		


OPACITY,ELREPHO,PAPER BACKING,FINE P
SAMPLE G22 = 86.9 PERCENT
SAMPLE G26 = 90.2 PERCENT
+,X,* NOT IN GRAND MEANS
ANALYSIS T60-2
SAMPLE G26
91.5
90.5
89.5
PERCENT
SAMPLE G22
85.5
86.5
87.5
88.5
PERCENT

REPORT NO. 63G TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS T61-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG

TAPPI OFFICIAL TEST METHOD T425 OS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE B01 MEAN	RAG BOND 75 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE A56 MEAN	AIR MAIL ENVELOPE 49 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D. = 10 VAR	F	LAB
L121	75.76	.61	.68	.76	1.09	78.85	.01	.01	.48	.52	61B	0	L121
L122	74.36	-.79	-.88	.73	1.04	77.81	-1.03	-.94	1.34	1.46	61D	0	L122
L131	74.40	-.75	-.83	.52	.74	77.60	-1.24	-1.13	.97	1.05	61R	0	L131
L134	79.10	3.95	4.40	.74	1.06	80.80	1.96	1.79	1.14	1.23	61F	#	L134
L150B	75.00	-.15	-.17	.88	1.26	77.65	-1.19	-1.08	1.03	1.12	61B	0	L150B
L159	74.34	-.81	-.90	.46	.66	78.66	-.18	-.16	.59	.65	61F	0	L159
L210B	75.93	.78	.87	.88	1.26	80.13	1.29	1.18	1.07	1.16	61B	0	L210B
L210D	75.42	.27	.30	.80	1.14	79.59	.75	.69	1.18	1.28	61D	0	L210D
L255	73.29	-1.86	-2.07	.57	.82	76.40	-2.44	-2.22	1.07	1.17	61E	0	L255
L261	75.73	.58	.65	.84	1.21	80.65	1.81	1.65	.65	.71	61B	0	L261
L281	76.19	1.04	1.16	.48	.69	79.61	.77	.70	.84	.92	61D	0	L281
L305	74.12	-1.03	-1.15	.70	1.01	78.19	-.65	-.59	.77	.83	61B	0	L305
L315	74.78	-.37	-.41	.83	1.19	79.53	.69	.63	1.16	1.26	61D	0	L315
L317	74.71	-.44	-.49	.58	.84	78.48	-.36	-.33	.79	.86	61B	0	L317
L318	75.60	.45	.50	.70	1.00	79.75	.91	.83	1.14	1.23	61E	0	L318
L326	73.87	-1.28	-1.42	.93	1.33	77.52	-1.32	-1.20	1.09	1.18	61B	0	L326
L328	76.70	1.55	1.73	.47	.68	80.78	1.94	1.77	.67	.73	61B	0	L328
L333	74.80	-.35	-.39	.60	.85	78.98	.14	.13	.81	.88	61B	0	L333
L352	75.43	.28	.31	.78	1.12	78.78	-.06	-.05	.71	.78	61F	0	L352
L581	75.74	.59	.66	.60	.86	78.96	.12	.11	.67	.73	61B	0	L581
L599	76.60	1.45	1.62	.74	1.06	79.35	.51	.47	1.76	1.91	61B	0	L599
L713	75.35	.20	.22	.80	1.15	78.32	-.52	-.47	.54	.59	61F	0	L713

GR. MEAN = 75.15 PERCENT GRAND MEAN = 78.84 PERCENT TEST DETERMINATIONS = 10

SD MEANS = .90 PERCENT SD OF MEANS = 1.10 PERCENT 21 LABS IN GRAND MEANS

AVERAGE SDR = .70 PERCENT AVERAGE SDR = .92 PERCENT

LAB CODE	B01 MEAN	DEV	N.DEV	SDR	R.SDR	A56 MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L150J	76.80	1.66	1.84	.92	1.31	75.67	-3.17	-2.89	.23	.24	61J	+	L150J
L153	75.15	.00	.00	.41	.59	79.40	.56	.51	.97	1.05	61C	+	L153
L244	74.88	-.27	-.30	.30	.43	81.69	2.85	2.60	.95	1.03	61J	+	L244
L260	75.15	.00	.00	.47	.68	78.39	-.45	-.41	.41	.44	61P	+	L260
L687	74.80	-.35	-.39	.67	.97	78.35	-.49	-.44	.41	.45	61P	+	L687
L738	76.16	1.01	1.13	.37	.54	81.09	2.25	2.05	.74	.80	61X	+	L738

TOTAL NUMBER OF LABORATORIES REPORTING = 28

Best values: B01 75.2 ± 1.4 percent
A56 78.8 ± 1.9 percent

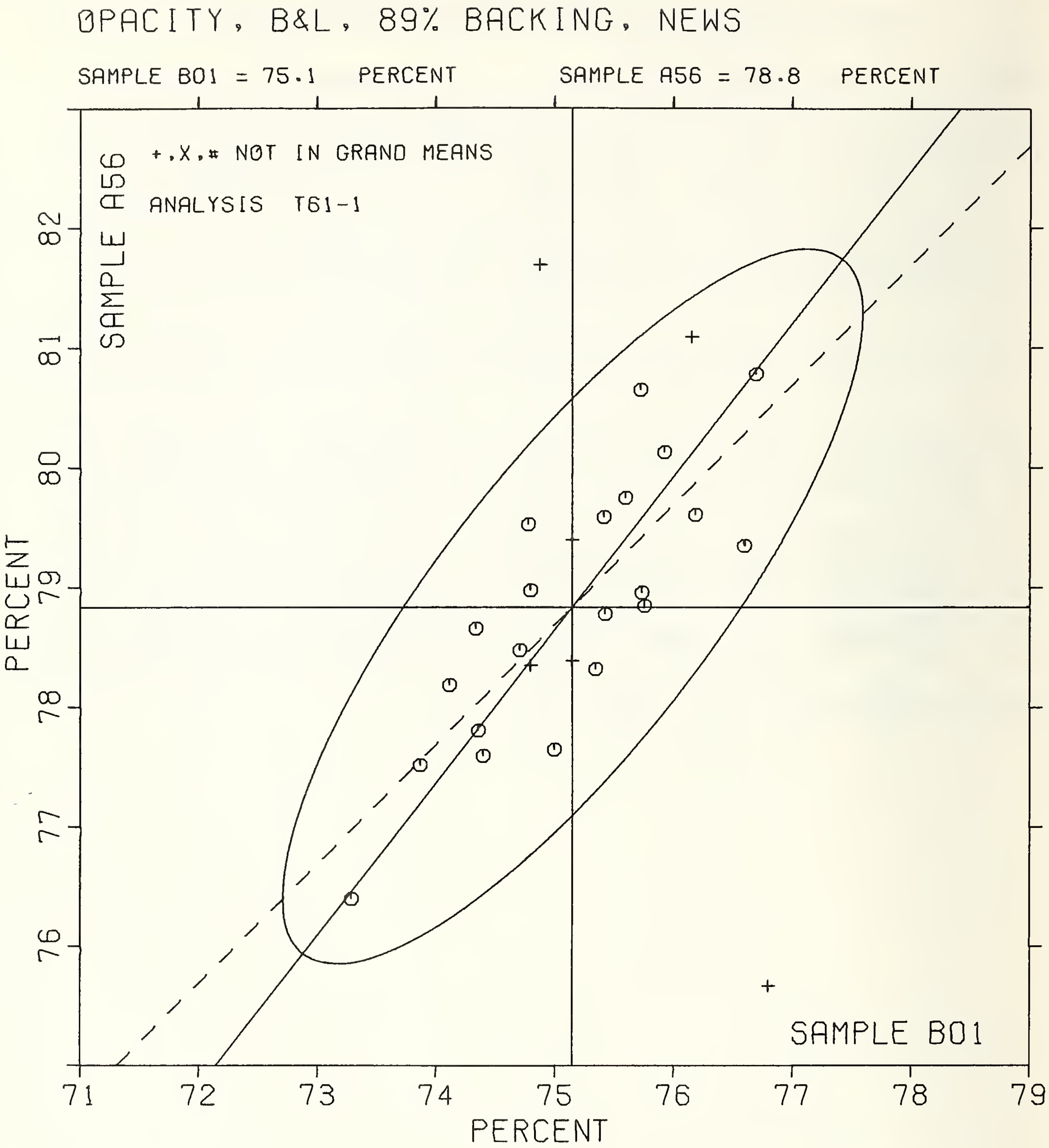
The following laboratories were omitted from the grand means because of extreme test results: 134

ANALYSIS 161-1 TABLE 2

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG

TAPPI OFFICIAL TEST METHOD T425 OS-75, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB		MEANS		COORDINATES		AVG		
CODE	F	801	A56	MAJOR	MINOR	R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L255	O	73.29	76.40	-3.07	-.04	.99	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L326	O	73.87	77.52	-1.83	.19	1.26	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L305	O	74.12	78.19	-1.14	.41	.92	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L159	O	74.34	78.66	-.64	.53	.65	61R	OPACITY (WHITE BACKING)70 TO 90%, THWING-ALBERT (WAS SRL)
L192	O	74.36	77.81	-1.30	-.01	1.25	61D	OPACITY (WHITE BACKING)70 TO 90%, BNL-2
L131	O	74.40	77.60	-1.44	-.17	.89	61R	OPACITY (WHITE BACKING)70 TO 90%, THWING-ALBERT (WAS SRL)
L317	O	74.71	78.48	-.55	.12	.85	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L315	O	74.78	79.53	.32	.72	1.22	61D	OPACITY (WHITE BACKING)70 TO 90%, BNL-2
L687	*	74.80	78.35	-.60	-.03	.71	61P	OPACITY (WHITE BACKING)70 TO 90%, PHOTOVOLT
L333	O	74.80	78.98	-.10	.36	.87	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L244	*	74.88	81.69	2.08	1.97	.73	61J	OPACITY (PAPER BACKING)70 TO 90%, Z.ELREPHO,FMY-C(10) FILTER
L150B	O	75.00	77.65	-1.03	-.62	1.19	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L260	*	75.15	78.39	-.35	-.28	.56	61P	OPACITY (WHITE BACKING)70 TO 90%, PHOTOVOLT
L153	*	75.15	79.40	.44	.35	.82	61C	OPACITY (PAPER BACKING)70 TO 90%, BAUSCH + LOMB
L713	O	75.35	78.32	-.28	-.48	.87	61R	OPACITY (WHITE BACKING)70 TO 90%, THWING-ALBERT (WAS SRL)
L219D	O	75.42	79.59	.76	.25	1.21	61D	OPACITY (WHITE BACKING)70 TO 90%, BNL-2
L352	O	75.43	78.78	.13	-.26	.95	61R	OPACITY (WHITE BACKING)70 TO 90%, THWING-ALBERT (WAS SRL)
L318	O	75.60	79.75	1.00	.21	1.12	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L261	O	75.73	80.65	1.79	.66	.96	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L581	O	75.74	78.96	.46	-.39	.79	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L121	O	75.76	78.85	.39	-.47	.80	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L210B	O	75.93	80.13	1.50	.18	1.21	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L738	*	76.16	81.09	2.40	.59	.67	61X	OPACITY, 70 TO 90%: GIVE INSTRUMENT MAKE, MODEL, BACKING
L281	O	76.19	79.61	1.25	-.34	.80	61D	OPACITY (WHITE BACKING)70 TO 90%, BNL-2
L599	O	76.60	79.35	1.30	-.83	1.49	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L328	O	76.70	80.78	2.49	-.02	.70	61B	OPACITY (WHITE BACKING)70 TO 90%, BAUSCH + LOMB
L150J	*	76.80	75.67	-1.48	-3.26	.78	61J	OPACITY (PAPER BACKING)70 TO 90%, Z.ELREPHO,FMY-C(10) FILTER
L134	#	79.10	80.80	3.98	-1.90	1.14	61R	OPACITY (WHITE BACKING)70 TO 90%, THWING-ALBERT (WAS SRL)
GMEANS:		75.15	78.84			1.00		
		95% ELLIPSE:		3.68	1.16	WITH GAMMA = 51 DEGREES		


OPACITY, B&L, 89% BACKING, NEWS
SAMPLE B01 = 75.1 PERCENT
SAMPLE A56 = 78.8 PERCENT
+,X,# NOT IN GRAND MEANS
ANALYSIS T61-1
SAMPLE A56
PERCENT
82
81
80
79
78
77
76
SAMPLE B01
71
72
73
74
75
76
77
78
79
PERCENT

ANALYSIS 165-1 TABLE 1

DIRECTIONAL BLUE REFLECTANCE IN PERCENT

TAPPI STANDARD T452 OS-77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT & GE) IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE J34 MEAN	PRINTING 73 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	SAMPLE J38 MEAN	PRINTING 89 GRAMS PER SQUARE METER DEV	N. DEV	SDR	R. SDR	TEST D. = 8 VAR	F	LAB
L108	67.15	-.05	-.11	.19	.94	75.79	-.15	-.32	.11	.68	65N	@	L108
L115	67.31	.11	.24	.10	.50	75.57	-.37	-.77	.13	.78	65N	@	L115
L122	67.14	-.06	-.14	.22	1.12	75.59	-.35	-.74	.11	.68	65N	@	L122
L132	67.36	.16	.34	.19	.98	75.61	-.33	-.69	.14	.82	65N	@	L132
L158	67.41	.21	.45	.16	.79	76.42	.48	1.01	.23	1.36	65N	@	L158
L176A	66.31	-.89	-1.91	.32	1.62	74.80	-1.14	-2.39	.05	.32	65A	@	L176A
L190C	67.11	-.09	-.19	.26	1.32	76.11	.17	.36	.14	.82	65A	@	L190C
L210M	67.32	.12	.26	.28	1.43	76.22	.28	.59	.10	.63	65M	@	L210M
L210N	67.35	.15	.32	.21	1.09	76.51	.57	1.19	.15	.88	65N	@	L210N
L211	68.24	1.04	2.22	.13	.66	76.75	.81	1.69	.16	.97	65N	@	L211
L225	67.52	.32	.69	.16	.80	76.27	.33	.70	.15	.90	65N	@	L225
L243	66.97	-.23	-.49	.19	.97	76.25	.31	.64	.19	1.17	65A	@	L243
L275	67.25	.05	.10	.38	1.92	75.65	-.29	-.61	.08	.46	65M	@	L275
L285	67.91	.71	1.53	.12	.63	76.62	.68	1.43	.28	1.71	65N	@	L285
L288	67.05	-.15	-.33	.18	.90	75.94	-.00	-.01	.63	3.84	65N	@	L288
L308	67.42	.22	.48	.17	.85	76.14	.20	.41	.19	1.16	65N	@	L308
L315	67.49	.29	.61	.24	1.20	76.34	.40	.83	.13	.79	65N	@	L315
L317	66.95	-.25	-.54	.16	.81	75.14	-.80	-1.69	.20	1.21	65M	@	L317
L565	67.71	.51	1.10	.12	.63	75.71	-.23	-.48	.11	.68	65A	@	L565
L636A	66.72	-.48	-1.02	.21	1.04	75.72	-.22	-.45	.14	.84	65M	@	L636A
L636B	66.85	-.35	-.76	.18	.90	75.94	-.00	-.01	.18	1.07	65M	@	L636B
L636C	66.01	-1.19	-2.55	.47	2.41	75.86	-.08	-.17	.23	1.37	65M	*	L636C
L673R	66.94	-.26	-.57	.14	.72	75.32	-.62	-1.29	.12	.71	65N	@	L673R
L692	67.32	.12	.26	.23	1.18	76.31	.37	.78	.08	.51	65N	@	L692

GR. MEAN = 67.20 PERCENT GRAND MEAN = 75.94 PERCENT TEST DETERMINATIONS = 8

SD MEANS = .47 PERCENT SD OF MEANS = .48 PERCENT 24 LABS IN GRAND MEANS

AVERAGE SDR = .20 PERCENT AVERAGE SDR = .17 PERCENT

LAB CODE	J34 MEAN	DEV	N. DEV	SDR	R. SDR	J38 MEAN	DEV	N. DEV	SDR	R. SDR	VAR	F	LAB
L105	66.64	-.56	-1.21	.14	.72	76.14	.20	.41	.16	.97	65T	+	L105
L213	67.07	-.13	-.27	.07	.36	76.10	.16	.33	.09	.56	65T	+	L213
L219	68.25	1.05	2.25	.27	1.36	78.12	2.18	4.57	.23	1.40	65F	+	L219
L223	67.45	.25	.53	.13	.67	76.89	.95	1.98	.14	.82	65G	+	L223
L224	67.56	.36	.77	.15	.77	76.57	.63	1.33	.18	1.11	65B	+	L224
L241	67.32	.12	.26	.21	1.08	76.06	.12	.25	.11	.64	65I	+	L241
L249	67.97	.77	1.66	.24	1.24	76.95	1.01	2.11	.09	.56	65P	+	L249
L256	66.54	-.66	-1.43	.18	.94	75.69	-.25	-.53	.18	1.10	65B	+	L256
L259	66.86	-.34	-.73	.22	1.12	75.77	-.17	-.35	.15	.90	65H	+	L259
L260	67.07	-.13	-.27	.07	.36	77.06	1.12	2.35	.09	.56	65P	+	L260
L277	68.12	.92	1.98	.64	3.26	74.69	-1.25	-2.63	1.69	10.23	65P	+	L277
L278	72.31	5.11	10.97	.59	3.02	81.00	5.06	10.60	.00	.00	65P	+	L278
L312	69.00	1.80	3.86	.00	.00	78.00	2.06	4.31	.00	.00	65F	+	L312
L321	69.00	1.80	3.86	.00	.00	79.00	3.06	6.41	.00	.00	65P	+	L321
L328	70.16	2.96	6.36	.22	1.12	77.45	1.51	3.16	.48	2.93	65P	+	L328
L339	69.62	2.42	5.20	.35	1.80	78.94	3.00	6.27	.18	1.07	65P	+	L339
L380	71.00	3.80	8.15	.00	.00	79.00	3.06	6.41	.00	.00	65P	+	L380
L442	66.75	-.45	-.97	.26	1.30	75.35	-.59	-1.24	.15	.92	65T	+	L442
L456	65.50	-1.70	-3.65	.19	.94	74.65	-1.29	-2.71	.19	1.12	65P	+	L456
L562	73.50	6.30	13.52	.00	.00	81.00	5.06	10.60	.00	.00	65P	+	L562
L564	70.12	2.92	6.27	.35	1.80	78.37	2.43	5.10	.52	3.14	65P	+	L564
L591	66.56	-.64	-1.38	.11	.58	75.22	-.72	-1.51	.12	.74	65B	+	L591
L617	68.14	.94	2.01	.51	2.58	77.66	1.72	3.60	.18	1.12	65G	+	L617
L626	69.44	2.24	4.80	.18	.90	77.56	1.62	3.39	.18	1.07	65P	+	L626
L643	67.17	-.03	-.06	.14	.71	75.77	-.17	-.35	.09	.54	65F	+	L643
L684	67.09	-.11	-.25	.49	2.47	67.69	-8.25	-17.29	.15	.88	65B	+	L684
L698	67.71	.51	1.10	.14	.69	76.60	.66	1.38	.13	.79	65I	+	L698
L702	70.00	2.80	6.01	.00	.00	78.44	2.50	5.23	.18	1.07	65X	+	L702
L704	68.87	1.67	3.59	.44	2.25	76.12	.18	.38	.23	1.40	65F	+	L704
L706	67.80	.60	1.28	.16	.81	76.99	1.05	2.19	.10	.60	65X	+	L706
L738	67.11	-.09	-.19	.20	1.03	76.26	.32	.67	.12	.72	65X	+	L738
L743	69.41	2.21	4.75	.15	.74	77.90	1.96	4.10	.05	.32	65X	+	L743

TOTAL NUMBER OF LABORATORIES REPORTING = 56

Best values: J34 67.0 ± 0.9 percent
J38 76.0 ± 0.8 percent

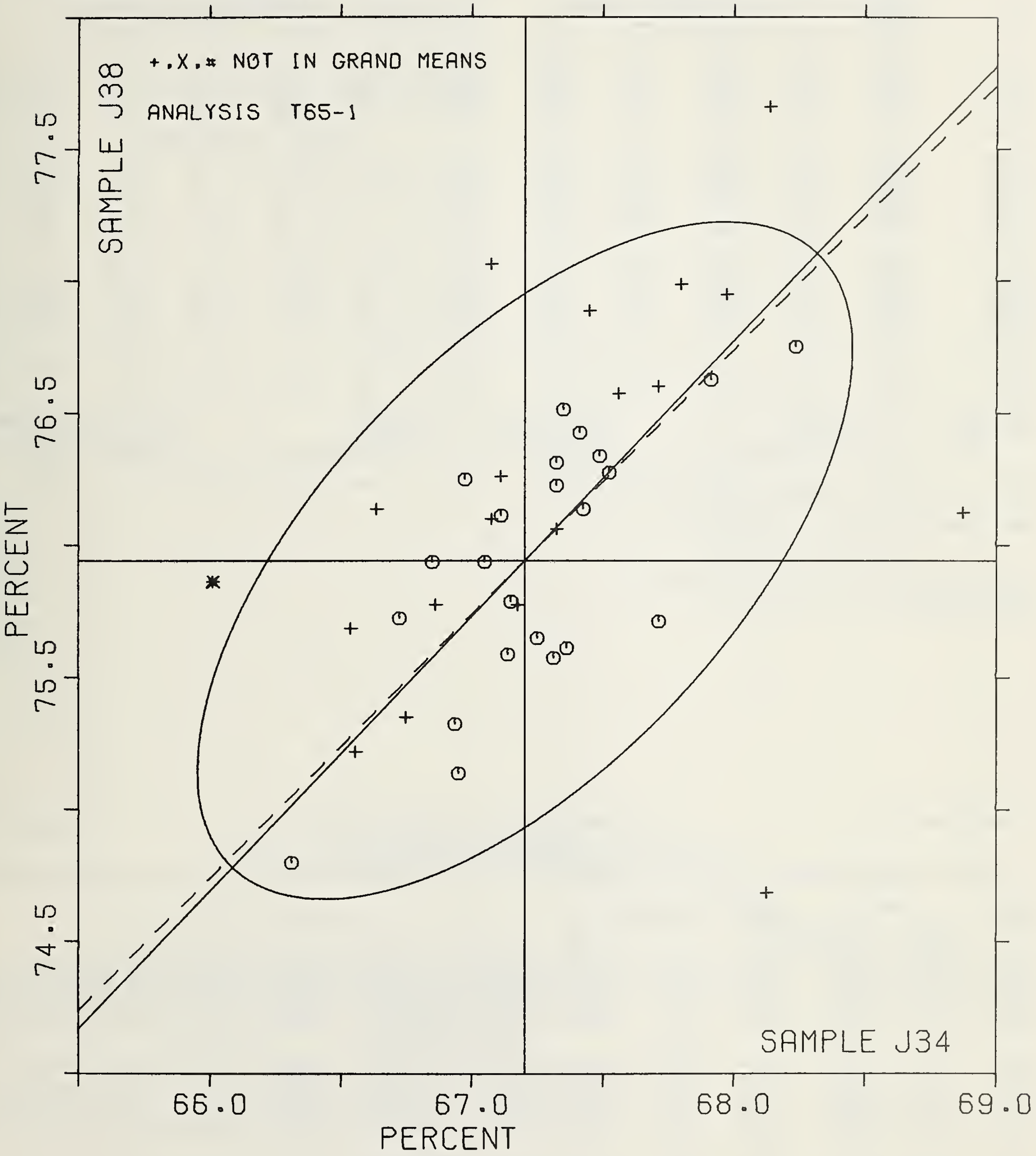
ANALYSIS T65-1 TABLE 2
DIRECTIONAL BLUE REFLECTANCE IN PERCENT
TAPPI STANDARD T452 OS-77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT & GE) IS STANDARD FOR THIS ANALYSIS

LAB		MEANS		COORDINATES		AVG		
CODE	F	J34	J38	MAJOR	MINOR	R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L456	+	65.50	74.65	-2.11	.33	1.03	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L636C	*	66.01	75.86	-.88	.80	1.89	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L176A	O	66.31	74.80	-1.44	-.15	.97	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2
L256	+	66.54	75.69	-.64	.30	1.02	65B	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L591	+	66.56	75.22	-.97	-.04	.66	65B	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L105	+	66.64	76.14	-.25	.54	.84	65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L636A	O	66.72	75.72	-.49	.19	.94	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L442	+	66.75	75.35	-.74	-.08	1.11	65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L636B	O	66.85	75.94	-.25	.25	.99	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L259	+	66.86	75.77	-.36	.13	1.01	65B	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L673R	O	66.94	75.32	-.63	-.24	.71	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L317	O	66.95	75.14	-.75	-.38	1.01	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L243	O	66.97	76.25	.06	.38	1.07	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2
L288	O	67.05	75.94	-.11	.11	2.37	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L260	+	67.07	77.06	.72	.87	.46	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L213	+	67.07	76.10	.03	.20	.46	65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L684	+	67.09	67.69	-6.03	-5.64	1.67	65B	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L738	+	67.11	76.26	.17	.29	.88	65X	BLUE REFLECTANCE:GIVE INSTR.( )DIFFUSE,( )DIRECTNL,TRAP?,BASE?
L190C	O	67.11	76.11	.06	.18	1.07	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2
L122	O	67.14	75.59	-.30	-.20	.90	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L108	O	67.15	75.79	-.15	-.07	.81	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L643	+	67.17	75.77	-.14	-.10	.62	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L275	O	67.25	75.65	-.18	-.24	1.19	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L115	O	67.31	75.57	-.19	-.33	.64	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L692	O	67.32	76.31	.35	.17	.84	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L210M	O	67.32	76.22	.29	.11	1.03	65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L241	+	67.32	76.06	.17	-.01	.86	65I	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L210N	O	67.35	76.51	.51	.29	.98	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L132	O	67.36	75.61	-.13	-.34	.90	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L158	O	67.41	76.42	.49	.18	1.08	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L308	O	67.42	76.14	.30	-.03	1.01	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L223	+	67.45	76.89	.85	.48	.74	65G	BLUE REFLECTANCE (DIRECTIONAL), GARDNER
L315	O	67.49	76.34	.48	.07	.99	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L225	O	67.52	76.27	.46	-.00	.85	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L224	+	67.56	76.57	.71	.18	.94	65B	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L698	+	67.71	76.60	.83	.09	.74	65I	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L565	O	67.71	75.71	.19	-.53	.66	65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT),S-2
L706	+	67.80	76.99	1.17	.29	.71	65X	BLUE REFLECTANCE:GIVE INSTR.( )DIFFUSE,( )DIRECTNL,TRAP?,BASE?
L285	O	67.91	76.62	.98	-.04	1.17	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L249	+	67.97	76.95	1.26	.14	.90	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L277	+	68.12	74.69	-.27	-1.53	6.74	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L617	+	68.14	77.66	1.89	.52	1.85	65G	BLUE REFLECTANCE (DIRECTIONAL), GARDNER
L211	O	68.24	76.75	1.30	-.19	.82	65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANO/M.S., S-4
L219	+	68.25	78.12	2.30	.76	1.38	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L704	+	68.87	76.12	1.29	-1.08	1.83	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L321	+	69.00	79.00	3.45	.82	.00	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L312	+	69.00	78.00	2.73	.13	.00	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L743	+	69.41	77.90	2.94	-.24	.53	65X	BLUE REFLECTANCE:GIVE INSTR.( )DIFFUSE,( )DIRECTNL,TRAP?,BASE?
L626	+	69.44	77.56	2.72	-.49	.98	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L339	+	69.62	78.94	3.84	.33	1.43	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L702	+	70.00	78.44	3.74	-.29	.54	65X	BLUE REFLECTANCE:GIVE INSTR.( )DIFFUSE,( )DIRECTNL,TRAP?,BASE?
L564	+	70.12	78.37	3.78	-.42	2.47	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L328	+	70.16	77.45	3.14	-1.09	2.03	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L380	+	71.00	79.00	4.84	-.62	.00	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L278	+	72.31	81.00	7.19	-.18	1.51	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L562	+	73.50	81.00	8.01	-1.04	.00	65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
GMEANS:		67.20	75.94			1.00		

95% ELLIPSE: 1.61 .78 WITH GAMMA = 46 DEGREES

BLUE REFLECTANCE, DIRECTIONAL

SAMPLE J34 = 67.2 PERCENT SAMPLE J38 = 75.9 PERCENT



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REPORT NO. 63G                    TAPPI COLLABORATIVE REFERENCE PROGRAM                        JANUARY 1980
                                           ANALYSIS 165-2  TABLE 1
                                 DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)
    TAPPI SUGGESTED METHOD T525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

           SAMPLE                PRINTING                  SAMPLE               PRINTING                TEST D.=  8
LAB         J34     73 GRAMS PER SQUARE METER              J38    89 GRAMS PER SQUARE METER
CODE       MEAN     DEV    N.DEV     SDR     R.SDR         MEAN     DEV    N.DEV     SDR     R.SDR      VAR   F  LAB

L100       66.25    -.13    -.31     .14      .88          75.05    .12     .32      .09      .73       65F   0 L100
L121       66.97     .59    1.37     .16      .98          75.54    .61    1.62      .21     1.62       65K   0 L121
L150       65.96    -.42    -.97     .29     1.78          75.43    .50    1.33      .30     2.34       65Q   # L150
L170       67.06     .68    1.57     .05      .32          75.40    .47    1.25      .00      .00       65E   0 L170
L182       66.44     .05     .12     .13      .81          74.90   -.03    -.08      .08      .59       65F   0 L182

L210K      68.11    1.73    4.00     .12      .74          76.22   1.29    3.44      .13      .98       65K   # L210K
L242       66.04    -.35    -.80     .23     1.44          74.61   -.32    -.85      .14     1.06       65F   0 L242
L244       65.36   -1.02   -2.36     .12      .74          74.21   -.72   -1.92      .11      .88       65F   0 L244
L250T      66.40     .02     .04     .27     1.66          75.07    .14     .39      .13     1.00       65F   0 L250T
L280       66.31    -.07    -.17     .24     1.46          74.85   -.08    -.22      .24     1.87       65Q   0 L280

L313       68.22    1.84    4.26     .17     1.03          76.54   1.61    4.29      .17     1.32       65K   # L313
L325       73.60    7.22   16.70     .15      .94          82.97   8.04   21.50      .13     1.00       65F   # L325
L349       66.40     .02     .04     .17     1.05          74.99    .06     .15      .08      .65       65K   0 L349
L446       66.12    -.27    -.62     .10      .63          74.52   -.41   -1.08      .13     1.04       65F   0 L446
L573       66.35    -.03    -.08     .14      .88          74.90   -.03    -.08      .20     1.57       65F   0 L573

L575       66.51     .13     .30     .15      .90          74.67   -.26    -.68      .15     1.17       65F   0 L575
L598       66.77     .39     .90     .21     1.27          75.37    .44    1.19      .10      .81       65K   0 L598

GR. MEAN = 66.38 PERCENT                        GRAND MEAN = 74.93 PERCENT                    TEST DETERMINATIONS =   8
SD MEANS =   .43 PERCENT                       SD OF MEANS =   .37 PERCENT                     13 LABS IN GRAND MEANS
                         AVERAGE SDR =   .16 PERCENT                         AVERAGE SDR =   .13 PERCENT

L289       66.56     .18     .41     .15      .93          74.96    .03     .08      .12      .93       650   + L289
TOTAL NUMBER OF LABORATORIES REPORTING =  18
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Best values: J34 66.3 ± 0.9 percent
J38 74.9 ± 0.6 percent

The following laboratories were omitted from the grand means because of extreme results: 150, 210K, 313, 325

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REPORT NO. 63G                    TAPPI COLLABORATIVE REFERENCE PROGRAM                        JANUARY 1980
                                           ANALYSIS 165-2  TABLE 2
                                 DIFFUSE BLUE REFLECTANCE IN PERCENT (GLOSS TRAP)
    TAPPI SUGGESTED METHOD T525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB          MEANS        COORDINATES    AVG
CODE  F   J34    J38    MAJOR    MINOR  R.SDR VAR   PROPERTY---TEST INSTRUMENT---CONDITIONS

L244  0  65.36  74.21   -1.24     .12    .81 65F DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L150  #  65.96  75.43     .00     .65   2.06 65Q DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, ZEISS ABSOLUTE BASE
L242  0  66.04  74.61    -.47    -.02   1.25 65F DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L446  0  66.12  74.52    -.47    -.13    .83 65F DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L100  0  66.25  75.05    -.02     .18    .80 65F DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE

L280  0  66.31  74.85    -.11    -.02   1.67 65Q DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, ZEISS ABSOLUTE BASE
L573  0  66.35  74.90    -.05    -.00   1.22 65F DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L349  0  66.40  74.99     .05     .03    .85 65K DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
L250T 0  66.40  75.07     .11     .10   1.33 65F DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L182  0  66.44  74.90     .02    -.06    .70 65F DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE

L575  0  66.51  74.67    -.07    -.28   1.03 65F DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE
L289  +  66.56  74.96     .16    -.09    .93 650 DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, SPECIFIC CALIBRATION
L598  0  66.77  75.37     .59     .08   1.04 65K DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
L121  0  66.97  75.54     .84     .08   1.30 65K DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
L170  0  67.06  75.40     .82    -.08    .16 65B DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NBS ABSOLUTE BASE

L210K #  68.11  76.22    2.15    -.14    .86 65K DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
L313  #  68.22  76.54    2.44     .03   1.18 65K DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, MGO (ZEISS) BASE
L325  #  73.60  82.97   10.71    1.44    .97 65F DIFFUSE REFLECTANCE, ELREPHO, GL.TRAP, NRC-PTB ABSOLUTE BASE

GMEANS:  66.38  74.93                   1.00
        95% ELLIPSE:     1.65     .36   WITH GAMMA = 40 DEGREES
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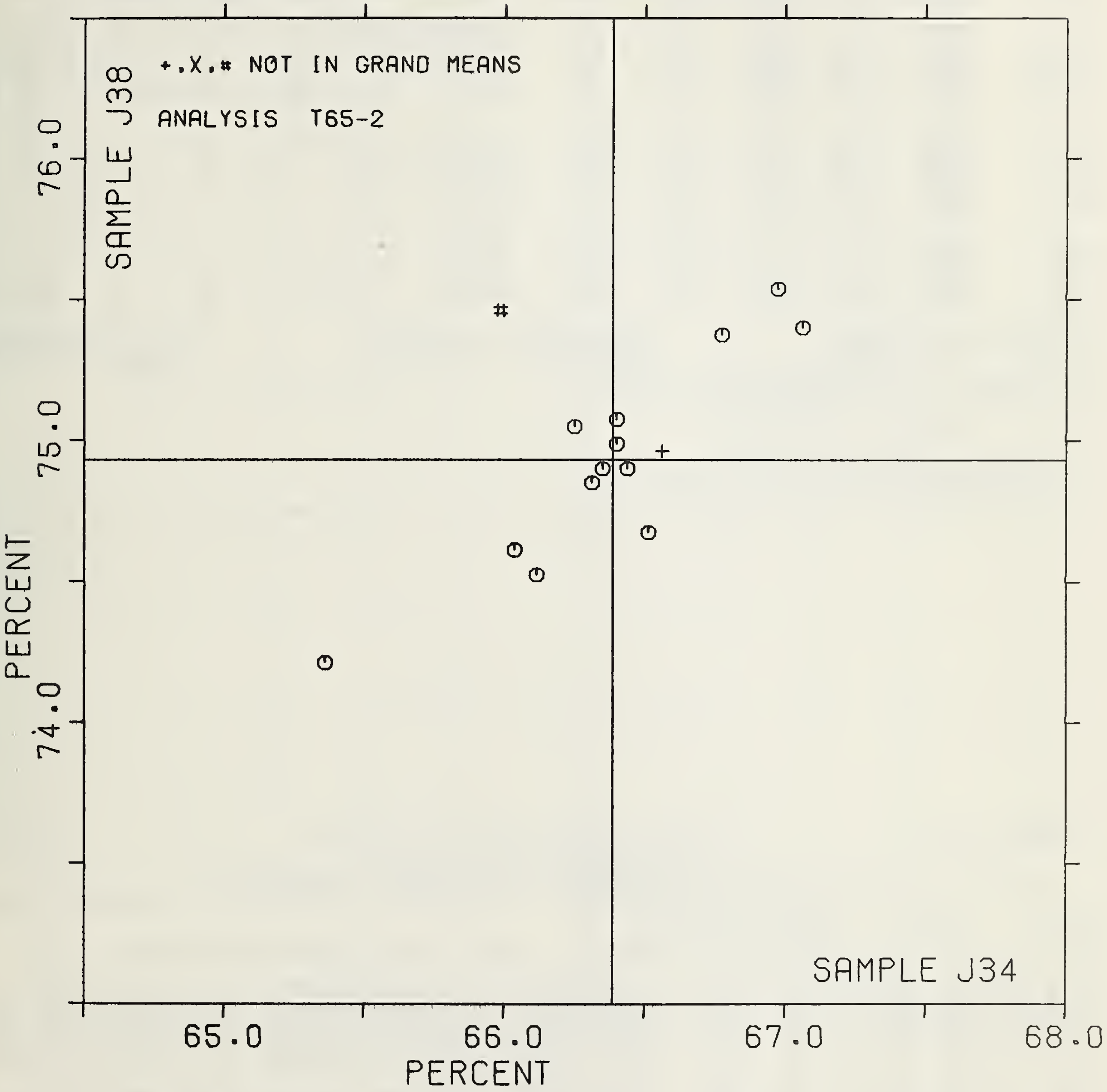
BLUE REFLECTANCE, DIFFUSE, WITH TRAP

SAMPLE J34 = 66.4 PERCENT SAMPLE J38 = 74.9 PERCENT



REPORT NO. 63G TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 765-3 TABLE 1

DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)

TAPPI SUGGESTED METHOD T525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

	SAMPLE	PRINTING				SAMPLE	PRINTING				TEST D. = 8		
LAB	J34	73 GRAMS PER SQUARE METER				J38	89 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L157	67.66	-.21	-.52	.27	2.18	77.11	.42	.72	.11	1.19	65E	O	L157
L161	76.72	8.85	21.73	.05	.37	67.96	-8.74	-14.91	.10	1.07	65E	#	L161
L173A	67.45	-.42	-1.04	.05	.43	76.10	-.59	-1.01	.08	.80	65E	O	L173A
L219	68.50	.63	1.54	.13	1.05	77.51	.82	1.40	.12	1.31	65E	O	L219
L238A	68.46	.59	1.45	.07	.60	77.01	.32	.55	.11	1.19	65E	O	L238A
L241	67.52	-.35	-.85	.13	1.03	75.81	-.88	-1.50	.11	1.19	65E	O	L241
L251	68.05	.18	.43	.12	.96	77.27	.58	.99	.09	.94	65E	O	L251
L255	67.97	.10	.25	.07	.57	76.87	.18	.31	.07	.75	65D	O	L255
L309	66.57	-1.30	-3.19	.32	2.59	76.65	-.04	-.07	.17	1.78	65J	#	L309
L360	68.25	.38	.93	.09	.74	77.26	.57	.97	.11	1.12	65E	O	L360
L384	67.89	.01	.04	.11	.90	76.67	-.02	-.03	.05	.49	65S	O	L384
L565	67.77	-.10	-.24	.22	1.75	76.05	-.64	-1.10	.14	1.49	65W	O	L565
L685	67.80	-.07	-.18	.11	.86	76.70	.01	.01	.08	.80	65E	O	L685
L734	67.14	-.74	-1.81	.12	.95	75.92	-.77	-1.31	.07	.75	65E	O	L734

GR. MEAN = 67.87 PERCENT GRAND MEAN = 76.69 PERCENT TEST DETERMINATIONS = 8

SD MEANS = .41 PERCENT SD OF MEANS = .59 PERCENT 12 LABS IN GRAND MEANS

AVERAGE SDR = .12 PERCENT AVERAGE SDR = .09 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 14

Best values: J34 67.8 ± 0.6 percent
J38 76.7 ± 0.8 percent

The following laboratories were omitted from the grand means because of extreme test results: 161, 309

REPORT NO. 63G TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 765-3 TABLE 2

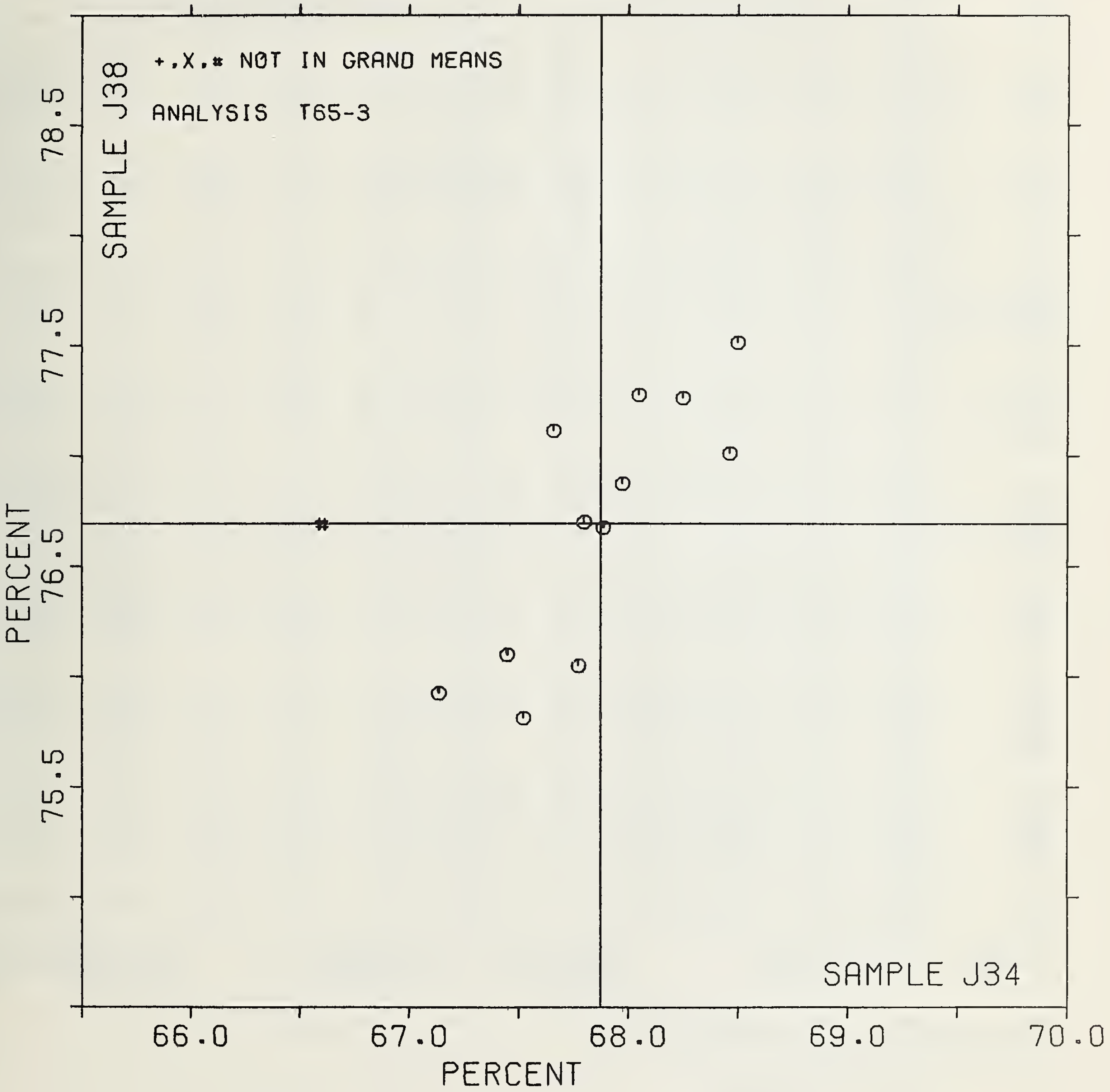
DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)

TAPPI SUGGESTED METHOD T525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB		MEANS		COORDINATES		AVG		
CODE	F	J34	J38	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L309	#	66.57	76.65	-.74	1.07	2.19	65J	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, NBS ABSOLUTE
L734	O	67.14	75.92	-1.04	.20	.85	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L173A	O	67.45	76.10	-.73	.04	.61	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L241	O	67.52	75.81	-.93	-.18	1.11	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L157	O	67.66	77.11	.24	.40	1.68	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L565	O	67.77	76.05	-.59	-.26	1.62	65W	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, NBS MGO BASE
L685	O	67.80	76.70	-.03	.07	.83	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L384	O	67.89	76.67	-.01	-.02	.69	65S	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, ABSOLUTE-UNKNOWN BASE
L255	O	67.97	76.87	.21	.01	.66	65D	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, NRC-PTB ABSOLUTE
L251	O	68.05	77.27	.59	.17	.95	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L360	O	68.25	77.26	.68	-.01	.93	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L238A	O	68.46	77.01	.59	-.32	.89	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L219	O	68.50	77.51	1.03	-.08	1.18	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
L161	#	76.72	67.96	-2.57	-12.17	.72	65E	DIFFUSE REFLECTANCE, ELREPHO, NO TRAP, MGO (ZEISS) BASE
GMEANS:		67.87	76.69			1.00		
		95% ELLIPSE:		2.06	.61	WITH GAMMA = 57 DEGREES		

BLUE REFLECTANCE, DIFFUSE, NO TRAP

SAMPLE J34 = 67.9 PERCENT SAMPLE J38 = 76.7 PERCENT



ANALYSIS 175-1 TABLE 1
SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - HIGH RANGE
TAPPI OFFICIAL TEST METHOD T480 OS-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	SAMPLE B80 MEAN	COATED OFFSET BOOK 75 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE E51 MEAN	COATED BOOK 118 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D. = 10 VAR	F	LAB
L108	62.8	1.8	.91	2.3	1.35	69.0	1.1	.55	.7	.62	75B	0	L108
L121	62.1	1.2	.58	2.0	1.18	66.1	-1.9	-.97	.9	.77	75H	0	L121
L122	61.1	.1	.07	1.6	.96	68.0	-.0	-.00	1.3	1.14	75H	0	L122
L132	62.7	1.7	.86	1.9	1.12	71.3	3.3	1.72	1.0	.86	75G	0	L132
L189	60.3	-.6	-.29	1.1	.63	68.0	.1	.04	.9	.78	75F	0	L189
L190C	57.4	-3.5	-1.74	2.8	1.63	63.3	-4.7	-2.43	1.6	1.43	75G	0	L190C
L190R	63.6	2.7	1.32	1.7	.99	69.2	1.3	.66	1.2	1.01	75G	0	L190R
L206	62.6	1.6	.81	2.1	1.21	68.7	.8	.41	1.1	.94	75H	0	L206
L210	65.2	4.2	2.10	1.7	.97	72.0	4.1	2.12	1.1	.99	75H	0	L210
L211	58.7	-2.3	-1.11	1.7	1.01	66.6	-1.4	-.73	.9	.78	75B	0	L211
L230	60.9	-.0	-.02	1.0	.60	68.3	.3	.16	1.1	.93	75H	0	L230
L243	60.8	-.1	-.07	1.9	1.09	67.9	-.1	-.03	1.5	1.33	75B	0	L243
L251	56.8	-4.1	-2.02	2.1	1.23	66.7	-1.2	-.63	1.0	.90	75G	*	L251
L253P	62.3	1.3	.66	1.0	.57	68.1	.2	.09	1.0	.84	75G	0	L253P
L255	63.7	2.8	1.39	1.5	.85	70.7	2.7	1.42	1.3	1.13	75G	0	L255
L256	64.0	3.0	1.49	2.6	1.49	71.2	3.2	1.69	1.1	.95	75H	0	L256
L262	61.2	.3	.13	1.1	.66	70.6	2.6	1.37	1.3	1.11	75K	0	L262
L277A	61.1	.2	.08	2.6	1.54	69.5	1.5	.80	1.1	.94	75H	0	L277A
L277B	61.7	.8	.38	1.8	1.06	69.4	1.4	.75	1.1	.94	75H	0	L277B
L278	57.6	-3.3	-1.64	1.3	.73	66.9	-1.1	-.57	1.3	1.09	75G	0	L278
L279	61.8	.9	.43	2.4	1.39	66.6	-1.4	-.71	1.0	.84	75G	0	L279
L291	62.5	1.6	.78	1.9	1.12	69.3	1.4	.71	.6	.55	75H	0	L291
L317	61.5	.6	.28	.8	.49	68.5	.5	.28	.7	.62	75H	0	L317
L321	60.8	-.1	-.07	.6	.37	67.7	-.3	-.14	3.8	3.30	75G	0	L321
L323	56.2	-4.8	-2.35	2.2	1.27	64.6	-3.4	-1.75	1.1	.98	75H	0	L323
L339	55.2	-5.7	-2.83	3.9	2.27	59.8	-8.2	-4.25	4.3	3.80	75P	#	L339
L349	61.9	1.0	.50	1.7	1.00	68.6	.7	.35	.9	.75	75H	0	L349
L388	57.2	-3.7	-1.84	2.0	1.19	64.5	-3.5	-1.80	1.8	1.54	75P	0	L388
L483	61.9	1.0	.50	1.7	.99	67.5	-.4	-.22	.9	.75	75B	0	L483
L564	59.5	-1.4	-.71	.7	.41	67.9	-.1	-.03	1.1	.96	75P	0	L564
L573	60.1	-.8	-.41	1.4	.84	67.3	-.7	-.35	1.2	1.01	75G	0	L573
L574	60.7	-.2	-.12	1.6	.95	66.6	-1.4	-.71	.8	.74	75G	0	L574
L583	62.3	1.4	.68	1.5	.89	69.7	1.7	.89	1.2	1.04	75H	0	L583
L592	60.8	-.2	-.08	2.1	1.25	67.7	-.3	-.14	.8	.74	75H	0	L592
L598	58.2	-2.8	-1.37	1.4	.80	65.8	-2.1	-1.12	1.2	1.03	75H	0	L598
L643	60.2	-.7	-.34	2.0	1.15	66.6	-1.3	-.69	.9	.77	75H	0	L643
L654	63.0	2.1	1.04	1.7	.98	70.4	2.4	1.27	1.1	.98	75B	0	L654
L668	59.1	-1.8	-.88	1.3	.75	66.7	-1.2	-.65	1.4	1.24	75G	0	L668
L670	61.6	.7	.33	1.9	1.09	68.9	1.0	.51	1.4	1.26	75H	0	L670
L697	60.8	-.2	-.08	2.1	1.20	67.9	-.1	-.05	.8	.74	75H	0	L697
L704	60.6	-.3	-.14	1.5	.86	65.1	-2.8	-1.47	.7	.58	75P	0	L704
L738	60.8	-.1	-.06	2.4	1.40	66.8	-1.2	-.61	1.1	.95	75B	0	L738

GR. MEAN = 60.9 GLOSS UNITS GRAND MEAN = 68.0 GLOSS UNITS TEST DETERMINATIONS = 10
SD MEANS = 2.0 GLOSS UNITS SD OF MEANS = 1.9 GLOSS UNITS 41 LABS IN GRAND MEANS
AVERAGE SDR = 1.7 GLOSS UNITS AVERAGE SDR = 1.1 GLOSS UNITS

L250	60.4	-.5	-.26	2.2	1.26	66.8	-1.2	-.61	2.5	2.21	75C	+	L250

TOTAL NUMBER OF LABORATORIES REPORTING = 43

Best values: B80 61 ± 4 gloss units
E51 68 ± 3 gloss units

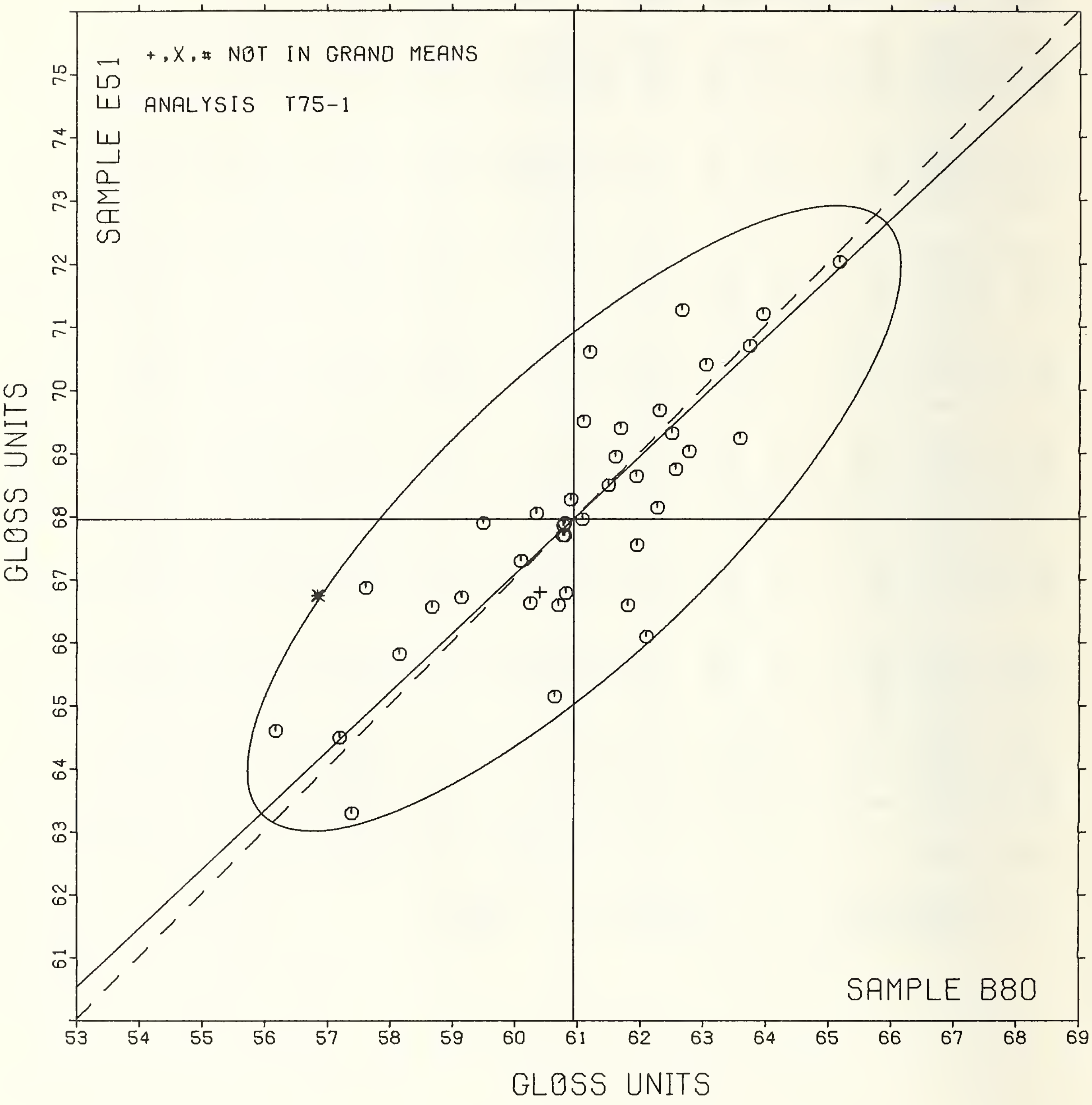
The following laboratories were omitted from the grand means because of extreme test results: 339

ANALYSIS T75-1 TABLE 2
SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - HIGH RANGE
TAPPI OFFICIAL TEST METHOD T480 OS-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB		MEANS		COORDINATES		AVG		
CODE	F	B80	E51	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L339	#	55.2	59.8	-9.8	-2.0	3.03	75P	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, PHOTOVOLT
L323	0	56.2	64.6	-5.8	.8	1.13	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L251	*	56.8	66.7	-3.8	1.9	1.07	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L388	0	57.2	64.5	-5.1	.0	1.37	75P	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, PHOTOVOLT
L190C	0	57.4	63.3	-5.8	-1.0	1.53	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L278	0	57.6	66.9	-3.2	1.5	.91	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L598	0	58.2	65.8	-3.5	.3	.92	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L211	0	58.7	66.6	-2.6	.5	.89	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L668	0	59.1	66.7	-2.2	.3	.99	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L564	0	59.5	67.9	-1.1	.9	.69	75P	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, PHOTOVOLT
L573	0	60.1	67.3	-1.1	.1	.93	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L643	0	60.2	66.6	-1.4	-.5	.96	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L189	0	60.3	68.0	-.4	.5	.71	75P	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, PHOTOVOLT
L250	+	60.4	66.8	-1.2	-.5	1.74	75Q	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, PHOTOVOLT,20C,65%RH
L704	0	60.6	65.1	-2.1	-1.9	.72	75P	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, PHOTOVOLT
L574	0	60.7	66.6	-1.1	-.8	.84	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L592	0	60.8	67.7	-.3	-.1	.99	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L697	0	60.8	67.9	-.2	.0	.97	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L243	0	60.8	67.9	-.1	.0	1.21	75B	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, BAUSCH + LOMB
L321	0	60.8	67.7	-.3	-.1	1.83	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L738	0	60.8	66.8	-.9	-.8	1.17	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L230	0	60.9	68.3	.2	.2	.77	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L122	0	61.1	68.0	.1	-.1	1.05	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L277A	0	61.1	69.5	1.2	1.0	1.24	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L262	0	61.2	70.6	2.0	1.7	.88	75K	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GAERTNER (K-C TYPE)
L317	0	61.5	68.5	.8	.0	.56	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L670	0	61.6	68.9	1.2	.3	1.17	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L277B	0	61.7	69.4	1.5	.5	1.00	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L279	0	61.8	66.6	-.3	-1.6	1.12	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L349	0	61.9	68.6	1.2	-.2	.88	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L483	0	61.9	67.5	.5	-1.0	.87	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L121	0	62.1	66.1	-.4	-2.2	.97	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L253P	0	62.3	68.1	1.1	-.8	.70	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L583	0	62.3	69.7	2.2	.3	.96	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L291	0	62.5	69.3	2.1	-.1	.84	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L206	0	62.6	68.7	1.7	-.5	1.08	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L132	0	62.7	71.3	3.5	1.2	.99	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L108	0	62.8	69.0	2.1	-.5	.98	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L654	0	63.0	70.4	3.2	.3	.98	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L190R	0	63.6	69.2	2.8	-.9	1.00	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L255	0	63.7	70.7	3.9	.1	.99	75G	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, GARDNER
L256	0	64.0	71.2	4.4	.3	1.22	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
L210	0	65.2	72.0	5.9	.1	.98	75H	SPECULAR GLOSS, 75 DEGREE, 50-95 UNITS, HUNTER
GMEANS:		60.9	68.0			1.00		
		95% ELLIPSE:		6.8	2.2	WITH GAMMA = 43 DEGREES		

SPECULAR GLOSS, 75 DEGREE-HIGH RANGE

SAMPLE B80 = 60.9 GLOSS UNITS SAMPLE E51 = 68.0 GLOSS UNITS



REPORT NO. 630 TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 176-1 TABLE 1

SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - LOW RANGE

TAPPI OFFICIAL TEST METHOD T480 OS-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

	SAMPLE	WATER RESISTANT BOOK				SAMPLE	RELEASE PAPER				TEST D.= 10		
LAB	G23	89 GRAMS PER SQUARE METER				B47	82 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L122	16.8	.3	.24	1.4	.90	48.3	.6	.26	1.6	.87	76H	0	L122
L128	16.8	.4	.27	2.1	1.37	46.6	-1.2	-.54	2.8	1.54	76G	0	L128
L134	14.5	-1.9	-1.42	1.2	.75	42.8	-5.0	-2.28	.8	.43	76H	0	L134
L149	18.6	2.2	1.59	1.3	.86	46.3	-1.5	-.67	1.8	.97	76G	0	L149
L153	15.1	-1.3	-.98	.8	.49	49.0	1.2	.56	1.7	.94	76G	0	L153
L162	18.9	2.5	1.83	1.0	.62	50.1	2.4	1.08	1.5	.85	76G	0	L162
L173A	17.2	.8	.56	1.8	1.16	47.5	-.3	-.12	1.9	1.04	76G	0	L173A
L182	15.5	-.9	-.65	1.7	1.11	47.8	.0	.02	1.6	.90	76H	0	L182
L210	17.2	.7	.53	1.6	1.01	51.5	3.7	1.72	1.4	.79	76H	0	L210
L213	16.5	.1	.08	2.2	1.39	47.0	-.7	-.34	3.8	2.07	76H	0	L213
L223	15.3	-1.1	-.83	1.6	1.05	47.1	-.7	-.30	1.5	.84	76H	0	L223
L226	17.4	1.0	.70	2.1	1.36	48.7	1.0	.44	3.0	1.64	76H	0	L226
L259	17.3	.8	.62	2.2	1.42	48.7	1.0	.44	2.5	1.39	76H	0	L259
L288	17.4	1.0	.71	1.8	1.15	50.6	2.8	1.28	1.4	.75	76H	0	L288
L317	15.0	-1.4	-1.05	1.8	1.13	48.5	.7	.33	1.8	.98	76H	0	L317
L328	17.6	1.2	.88	1.9	1.19	47.9	.1	.04	1.5	.80	76H	0	L328
L456	15.2	-1.2	-.88	.7	.43	49.6	1.9	.86	1.7	.93	76H	0	L456
L554	15.8	-.6	-.43	1.0	.64	46.0	-1.8	-.83	1.2	.68	76H	0	L554
L713	14.0	-2.4	-1.76	1.5	.96	43.5	-4.3	-1.95	1.0	.57	76H	0	L713

GR. MEAN = 16.4 GLOSS UNITS GRAND MEAN = 47.8 GLOSS UNITS TEST DETERMINATIONS = 10

SD MEANS = 1.4 GLOSS UNITS SD OF MEANS = 2.2 GLOSS UNITS 19 LABS IN GRAND MEANS

AVERAGE SDR = 1.6 GLOSS UNITS AVERAGE SDR = 1.8 GLOSS UNITS

L250	20.4	4.0	2.91	2.8	1.81	50.6	2.8	1.30	1.6	.87	76Q	*	L250

TOTAL NUMBER OF LABORATORIES REPORTING = 20

Best values:	G23	16	±	2 gloss units
	B47	48	±	4 gloss units

REPORT NO. 630 TAPPI COLLABORATIVE REFERENCE PROGRAM JANUARY 1980

ANALYSIS 176-1 TABLE 2

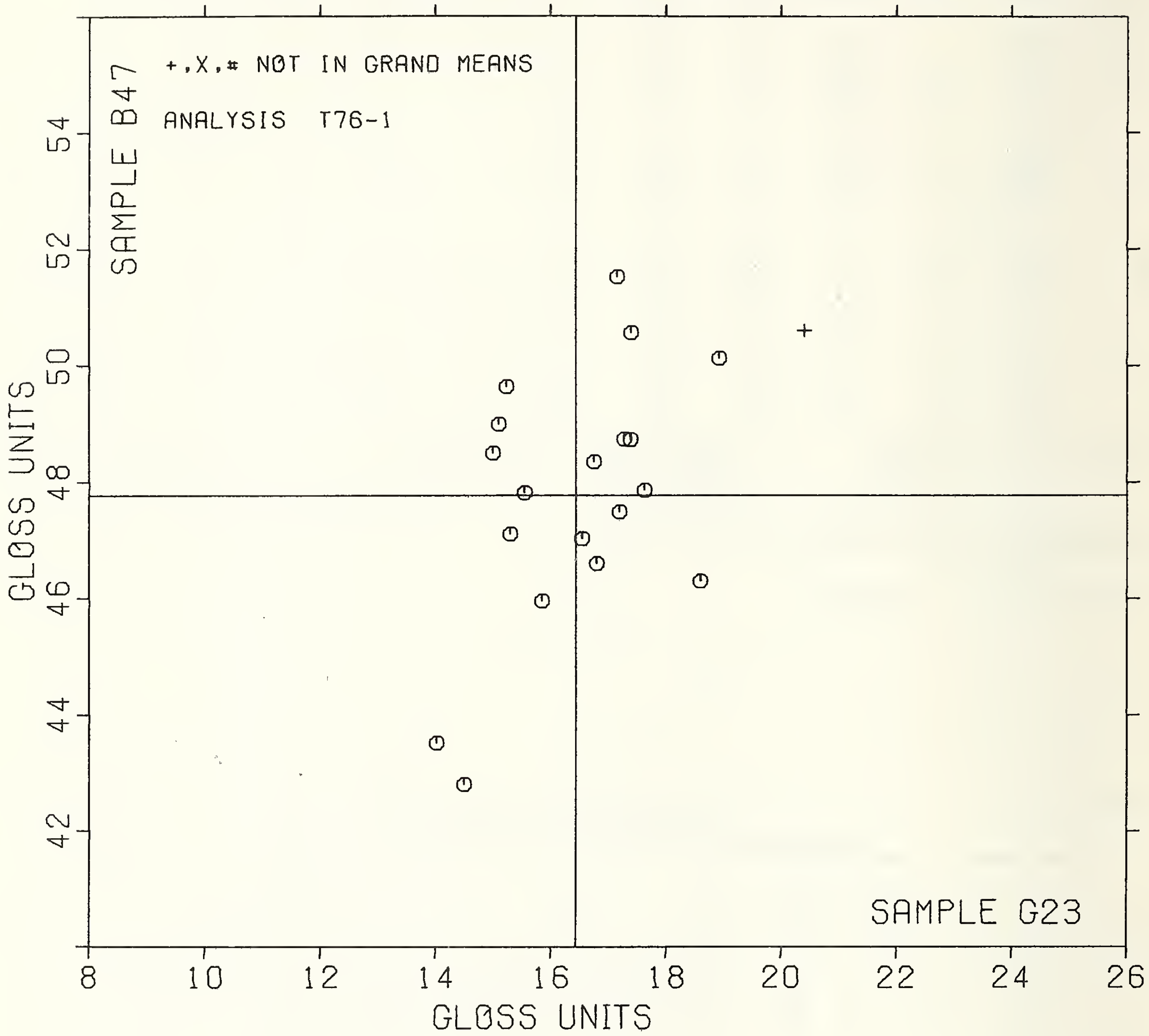
SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - LOW RANGE

TAPPI OFFICIAL TEST METHOD T480 OS-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB		MEANS		COORDINATES		AVG		
CODE	F	G23	B47	MAJOR	MINOR	R.SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L713	0	14.0	43.5	-4.8	.6	.77	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L134	0	14.5	42.8	-5.3	-.1	.59	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L317	0	15.0	48.5	.1	1.6	1.05	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L153	0	15.1	49.0	.6	1.7	.72	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, GARDNER
L456	0	15.2	49.6	1.3	1.8	.68	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L223	0	15.3	47.1	-1.0	.8	.95	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L182	0	15.5	47.8	-.3	.8	1.00	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L554	0	15.8	46.0	-1.9	-.2	.66	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L213	0	16.5	47.0	-.6	-.4	1.73	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L122	0	16.8	48.3	.7	-.1	.89	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L128	0	16.8	46.6	-.9	-.8	1.45	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, GARDNER
L210	0	17.2	51.5	3.7	.8	.90	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L173A	0	17.2	47.5	.0	-.8	1.10	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, GARDNER
L259	0	17.3	48.7	1.2	-.4	1.40	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L226	0	17.4	48.7	1.3	-.5	1.50	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L288	0	17.4	50.6	2.9	.2	.95	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L328	0	17.6	47.9	.5	-1.1	1.00	76H	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, HUNTER
L149	0	18.6	46.3	-.5	-2.6	.92	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, GARDNER
L162	0	18.9	50.1	3.1	-1.4	.74	76G	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, GARDNER
L250	*	20.4	50.6	4.1	-2.6	1.34	76Q	SPECULAR GLOSS, 75 DEGREE, 20-65 UNITS, PHOTOVOLT,20C,65%RH
GMEANS:		16.4	47.8			1.00		
		95% ELLIPSE:		6.4	3.1	WITH GAMMA = 67 DEGREES		

SPECULAR GLOSS, 75 DEGREE-LOW RANGE

SAMPLE G23 = 16.4 GLOSS UNITS SAMPLE B47 = 47.8 GLOSS UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 1
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI OFFICIAL TEST METHOD T411 OS-76

	SAMPLE	BLEACHED BAG				SAMPLE	KRAFT ENVELOPE				TEST D. = 10		
LAB	A88	82 GRAMS PER SQUARE METER				G31	123 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L105	5.230	-.043	-.50	.026	.43	7.049	-.019	-.16	.043	.75	90Q	0	L105
L118	5.252	-.021	-.24	.053	.88	7.101	.033	.29	.047	.82	90Q	0	L118
L122	5.321	.048	.56	.079	1.31	7.238	.170	1.48	.060	1.05	90V	0	L122
L123F	5.495	.222	2.57	.069	1.14	7.355	.287	2.49	.060	1.05	90F	*	L123F
L125	5.200	-.073	-.84	.067	1.11	6.880	-.188	-1.63	.063	1.10	90T	0	L125
L128	5.328	.055	.64	.052	.86	7.052	-.016	-.14	.043	.76	90T	0	L128
L141	5.275	.002	.02	.063	1.06	7.085	.017	.15	.041	.72	90T	0	L141
L153	5.247	-.026	-.30	.065	1.09	6.983	-.085	-.74	.065	1.14	90T	0	L153
L158	5.270	-.003	-.03	.067	1.12	7.070	.002	.02	.082	1.44	90T	0	L158
L159	5.265	-.008	-.09	.071	1.18	7.200	.132	1.15	.082	1.43	90T	0	L159
L162	5.360	.087	1.01	.065	1.09	7.220	.152	1.32	.058	1.01	90V	0	L162
L166	5.311	.038	.44	.029	.48	7.095	.027	.24	.048	.84	90T	0	L166
L173B	5.270	-.003	-.03	.048	.80	7.070	.002	.02	.048	.84	90F	0	L173B
L174	5.280	.007	.08	.063	1.05	7.160	.092	.80	.070	1.22	90T	0	L174
L182	5.315	.042	.49	.071	1.18	7.080	.012	.11	.042	.73	90L	0	L182
L183	5.286	.013	.15	.056	.93	7.053	-.015	-.13	.057	1.00	90T	0	L183
L190C	5.120	-.153	-1.77	.063	1.05	6.830	-.238	-2.06	.082	1.44	90T	0	L190C
L212	5.332	.059	.68	.064	1.07	7.115	.047	.41	.048	.84	90T	0	L212
L213	5.270	-.003	-.03	.048	.80	7.080	.012	.11	.042	.74	90T	0	L213
L223	5.248	-.025	-.29	.075	1.25	7.064	-.004	-.03	.021	.36	90V	0	L223
L228	5.342	.069	.80	.040	.67	7.126	.058	.50	.057	1.00	90T	0	L228
L233	5.326	.053	.61	.049	.82	7.131	.063	.55	.052	.91	90Q	0	L233
L238A	5.314	.041	.47	.058	.97	7.043	-.025	-.22	.068	1.19	90T	0	L238A
L241	5.220	-.053	-.61	.048	.80	6.980	-.088	-.76	.109	1.89	90T	0	L241
L2420	5.256	-.017	-.20	.070	1.17	7.001	-.066	-.58	.059	1.03	90E	0	L2420
L242P	5.201	-.072	-.83	.059	.98	7.033	-.035	-.30	.033	.58	90P	0	L242P
L249	5.249	-.024	-.28	.081	1.36	7.007	-.061	-.53	.060	1.04	90T	0	L249
L259	5.383	.110	1.27	.090	1.49	7.194	.126	1.09	.046	.79	90Q	0	L259
L260	5.117	-.156	-1.80	.058	.97	6.977	-.091	-.79	.041	.71	90T	0	L260
L261	5.341	.068	.79	.050	.84	7.137	.069	.60	.065	1.13	90T	0	L261
L262	5.300	.027	.31	.033	.56	6.940	-.128	-1.11	.061	1.07	90T	0	L262
L285	5.443	.170	1.97	.035	.58	7.146	.078	.68	.047	.82	90T	*	L285
L291	5.222	-.051	-.59	.051	.85	6.956	-.112	-.97	.044	.77	90T	0	L291
L305	5.260	-.013	-.15	.052	.86	7.090	.022	.19	.032	.55	90T	0	L305
L309	5.280	.007	.08	.079	1.31	7.060	-.008	-.07	.052	.90	90T	0	L309
L315	5.345	.072	.83	.117	1.94	7.255	.187	1.62	.109	1.91	90T	0	L315
L318	5.139	-.134	-1.55	.074	1.24	7.066	-.002	-.02	.040	.69	90T	*	L318
L320	5.365	.092	1.06	.058	.97	7.135	.067	.58	.063	1.09	90T	0	L320
L323	5.330	.057	.66	.048	.80	7.230	.162	1.41	.067	1.18	90T	0	L323
L324	5.200	-.073	-.84	.047	.79	6.970	-.098	-.85	.067	1.18	90T	0	L324
L326	5.335	.062	.72	.078	1.31	7.115	.047	.41	.047	.83	90T	0	L326
L328	5.240	-.033	-.38	.047	.79	7.059	-.009	-.08	.049	.86	90T	0	L328
L333	5.143	-.130	-1.50	.036	.60	6.969	-.099	-.86	.052	.91	90V	0	L333
L339	5.143	-.130	-1.50	.057	.94	6.916	-.152	-1.31	.045	.79	90T	0	L339
L341	5.365	.092	1.06	.041	.68	7.168	.100	.87	.030	.52	90T	0	L341
L352	5.175	-.098	-1.13	.108	1.80	6.957	-.111	-.96	.110	1.92	90Q	0	L352
L356	1.324	-3.949	-45.64	.018	.30	1.765	-5.303	-46.00	.013	.22	90T	*	L356
L358	5.191	-.082	-.95	.045	.76	6.952	-.116	-1.01	.042	.73	90T	0	L358
L376	5.170	-.103	-1.19	.125	2.09	6.860	-.208	-1.80	.070	1.22	90T	0	L376
L380	5.310	.037	.43	.057	.95	7.000	-.068	-.59	.000	.00	90T	0	L380
L382	5.280	.007	.08	.042	.70	7.135	.067	.58	.082	1.43	90T	0	L382
L442	5.515	.242	2.80	.059	.98	7.365	.297	2.58	.054	.94	90V	*	L442
L554	5.270	-.003	-.03	.026	.43	7.030	-.038	-.33	.035	.61	90D	0	L554
L556	5.275	.002	.02	.057	.96	7.099	.031	.27	.053	.92	90T	0	L556
L567	5.198	-.075	-.87	.104	1.73	7.069	.001	.01	.143	2.50	90V	0	L567
L571	5.270	-.003	-.03	.082	1.37	7.150	.082	.71	.118	2.06	90V	0	L571
L574	5.140	-.133	-1.54	.055	.92	6.866	-.202	-1.75	.044	.77	90V	0	L574
L575	5.333	.060	.69	.051	.86	7.092	.024	.21	.042	.74	90T	0	L575
L576	5.299	.026	.30	.077	1.29	7.167	.099	.86	.052	.90	90T	0	L576
L581	5.330	.057	.66	.059	.98	7.145	.077	.67	.037	.64	90T	0	L581
L626	5.058	-.215	-2.48	.068	1.14	6.818	-.250	-2.17	.030	.52	90T	0	L626
L693	5.195	-.078	-.90	.049	.81	6.956	-.112	-.97	.050	.87	90T	0	L693
L704	5.205	-.068	-.79	.037	.61	6.890	-.178	-1.54	.074	1.29	90T	0	L704
L713	5.382	.109	1.26	.038	.64	7.218	.150	1.30	.053	.92	90T	0	L713
L737	5.340	.067	.77	.046	.77	7.090	.022	.19	.052	.90	90T	0	L737

GR. MEAN = 5.273 MILS
SD MEANS = .087 MILS
AVERAGE SDR = .060 MILS
GR. MEAN =133.93 MICROMETER

GRAND MEAN = 7.068 MILS
SD OF MEANS = .115 MILS
AVERAGE SDR = .057 MILS
GRAND MEAN =179.52 MICROMETER

TEST DETERMINATIONS = 10
64 LABS IN GRAND MEANS

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 1
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI OFFICIAL TEST METHOD T411 OS-76

	SAMPLE	BLEACHED BAG				SAMPLE	KRAFT ENVELOPE				TEST D. = 10		
LAB	A88	82 GRAMS PER SQUARE METER				G31	123 GRAMS PER SQUARE METER						
CODE	MEAN	DEV	N.DEV	SDR	R.SDR	MEAN	DEV	N.DEV	SDR	R.SDR	VAR	F	LAB
L100	5.370	.097	1.12	.068	1.14	7.206	.138	1.20	.055	.96	90B	*	L100
L106	5.060	-.213	-2.46	.052	.86	6.990	-.078	-.68	.032	.55	90C	*	L106
L108	5.170	-.103	-1.19	.048	.80	7.000	-.068	-.59	.082	1.43	90C	*	L108
L134	5.369	.096	1.11	.059	.98	7.094	.026	.23	.030	.53	90X	*	L134
L185	5.360	.087	1.01	.052	.86	7.260	.192	1.67	.084	1.47	90B	*	L185
L243	5.416	.143	1.65	.055	.91	7.088	.020	.17	.047	.83	90S	*	L243
L251	5.299	.026	.30	.038	.64	7.088	.020	.18	.063	1.10	90W	*	L251
L342	5.200	-.073	-.84	.051	.85	6.927	-.141	-1.22	.026	.45	90U	*	L342
L484	4.898	-.375	-4.34	.046	.77	6.744	-.324	-2.81	.032	.57	90E	*	L484
L563	5.400	.127	1.47	.082	1.36	7.200	.132	1.15	.094	1.65	90U	*	L563
L616	5.070	-.203	-2.35	.082	1.37	7.010	-.058	-.50	.032	.55	90C	*	L616
L684	5.300	.027	.31	.000	.00	7.050	-.018	-.16	.053	.92	90U	*	L684
L702	5.090	-.183	-2.11	.032	.53	7.030	-.038	-.33	.067	1.18	90X	*	L702
L706	5.290	.017	.20	.074	1.23	7.070	.002	.02	.067	1.18	90X	*	L706
L731	5.327	.054	.62	.071	1.19	7.080	.012	.11	.019	.33	90A	*	L731

TOTAL NUMBER OF LABORATORIES REPORTING = 80

Best values: A88 5.27 ± 0.14 mils
G31 7.07 ± 0.20 mils

Data from the following laboratories appear to be off by a multiplicative factor: 356

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 2
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI OFFICIAL TEST METHOD T411 OS-76

LAB CODE	F	MEANS A88	MEANS G31	COORDINATES MAJOR	COORDINATES MINOR	AVG R. SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
L356	#	1.324	1.765	-6.610	.147	.26	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L484	+	4.898	6.744	-.481	.118	.67	90E	THICKNESS (CALIPER), SCHOPPER, HAND DRIVEN
L626	O	5.058	6.818	-.328	.030	.83	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L106	+	5.060	6.990	-.187	.128	.71	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN
L616	+	5.070	7.010	-.165	.132	.96	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN
L702	+	5.090	7.030	-.137	.127	.85	90X	THICKNESS (CALIPER): GIVE INSTR. MAKE+MODEL.( )MOTOR,( )HAND
L260	O	5.117	6.977	-.164	.074	.84	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L190C	O	5.120	6.830	-.283	-.013	1.25	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L318	*	5.139	7.066	-.079	.108	.97	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L574	O	5.140	6.866	-.242	-.009	.84	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L339	O	5.143	6.916	-.199	.016	.87	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L333	O	5.143	6.969	-.156	.049	.76	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L108	+	5.170	7.000	-.115	.045	1.12	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN
L376	O	5.170	6.860	-.229	-.036	1.65	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L352	O	5.175	6.957	-.147	.016	1.86	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L358	O	5.191	6.952	-.142	-.000	.74	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L693	O	5.195	6.956	-.136	-.001	.84	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L567	O	5.198	7.069	-.043	.062	2.11	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L125	O	5.200	6.880	-.195	-.049	1.11	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L342	+	5.200	6.927	-.157	-.022	.65	90U	THICKNESS (CALIPER), TMI, HAND DRIVEN
L324	O	5.200	6.970	-.122	.003	.98	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L242P	O	5.201	7.033	-.070	.039	.78	90P	THICKNESS (CALIPER), MESSMER, MOTOR DRIVEN, ISO R534
L704	O	5.205	6.890	-.184	-.048	.95	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L241	O	5.220	6.980	-.102	-.008	1.35	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L291	O	5.222	6.956	-.121	-.023	.81	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L105	O	5.230	7.049	-.040	.024	.59	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L328	O	5.240	7.059	-.026	.022	.82	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L153	O	5.247	6.983	-.084	-.028	1.11	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L223	O	5.248	7.064	-.018	.018	.80	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L249	O	5.249	7.007	-.064	-.016	1.20	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L118	O	5.252	7.101	.015	.036	.85	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L242O	O	5.256	7.001	-.064	-.025	1.10	90O	THICKNESS (CALIPER), MESSMER, MOTOR DRIVEN, BS3983
L305	O	5.260	7.090	.011	.023	.71	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L159	O	5.265	7.200	.103	.083	1.30	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L213	O	5.270	7.080	.008	.009	.77	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L173B	O	5.270	7.070	.000	.004	.82	90F	THICKNESS (CALIPER), FEDERAL, MOTOR DRIVEN
L571	O	5.270	7.150	.065	.050	1.71	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L158	O	5.270	7.070	.000	.004	1.28	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L554	O	5.270	7.030	-.033	-.020	.52	90D	THICKNESS (CALIPER), CADY, MOTOR DRIVEN
L141	O	5.275	7.085	.015	.008	.89	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L556	O	5.275	7.099	.027	.016	.94	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L382	O	5.280	7.135	.059	.033	1.07	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L174	O	5.280	7.160	.079	.048	1.14	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L309	O	5.280	7.060	-.002	-.010	1.11	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L183	O	5.286	7.053	-.005	-.019	.97	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L706	+	5.290	7.070	.012	-.013	1.20	90X	THICKNESS (CALIPER): GIVE INSTR. MAKE+MODEL.( )MOTOR,( )HAND
L576	O	5.299	7.167	.096	.036	1.10	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L251	+	5.299	7.088	.032	-.010	.87	90W	THICKNESS (CALIPER), L + W. MOTOR DRIVEN, 20 C, 65% RH
L262	O	5.300	6.940	-.089	-.096	.81	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L684	+	5.300	7.050	.001	-.032	.46	90U	THICKNESS (CALIPER), TMI, HAND DRIVEN
L380	O	5.310	7.000	-.034	-.070	.47	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L166	O	5.311	7.095	.044	-.015	.66	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L238A	O	5.314	7.043	.003	-.048	1.08	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L182	O	5.315	7.080	.034	-.027	.95	90L	THICKNESS (CALIPER), L + W. MOTOR DRIVEN
L122	O	5.321	7.238	.167	.059	1.18	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN,DIGITIZED
L233	O	5.326	7.131	.082	-.007	.86	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L731	+	5.327	7.080	.041	-.037	.76	90A	THICKNESS (CALIPER), L + W. HAND DRIVEN
L128	O	5.328	7.052	.019	-.054	.81	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L323	O	5.330	7.230	.165	.047	.99	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L581	O	5.330	7.145	.096	-.002	.81	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L212	O	5.332	7.115	.073	-.021	.96	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L575	O	5.333	7.092	.054	-.035	.80	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L326	O	5.335	7.115	.074	-.023	1.07	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L737	O	5.340	7.090	.057	-.042	.83	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L261	O	5.341	7.137	.096	-.015	.98	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN

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                              TAPPI COLLABORATIVE REFERENCE PROGRAM
                                   ANALYSIS 190-1  TABLE 2
                           THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
                              TAPPI OFFICIAL TEST METHOD T411 OS-76

LAB         MEANS        COORDINATES    AVG
CODE  F   A88    G31     MAJOR   MINOR  R.SDR VAR   PROPERTY---TEST INSTRUMENT---CONDITIONS

L228  0  5.342  7.126    .087   -.023    .84 90T THICKNESS (CALIPER), TMI,     MOTOR DRIVEN
L315  0  5.345  7.255    .194    .050   1.92 90T THICKNESS (CALIPER), TMI,     MOTOR DRIVEN
L162  0  5.360  7.220    .174    .017   1.05 90V THICKNESS (CALIPER), TMI,     MOTOR DRIVEN,DIGITIZED
L185  +  5.360  7.260    .207    .040   1.17 90B THICKNESS (CALIPER), AMTHOR,   HAND DRIVEN
L320  0  5.365  7.135    .108   -.036   1.03 90T THICKNESS (CALIPER), TMI,     MOTOR DRIVEN

L341  0  5.365  7.168    .135   -.017    .60 90T THICKNESS (CALIPER), TMI,     MOTOR DRIVEN
L134  +  5.369  7.094    .077   -.063    .75 90X THICKNESS (CALIPER): GIVE INSTR. MAKE*MODEL.(  )MOTOR,(  )HAND
L100  +  5.370  7.206    .169    .001   1.05 90B THICKNESS (CALIPER), AMTHOR,   HAND DRIVEN
L713  0  5.382  7.218    .186   -.002    .78 90T THICKNESS (CALIPER), TMI,     MOTOR DRIVEN
L259  0  5.383  7.194    .167   -.017   1.14 90Q THICKNESS (CALIPER), EMVECO,  MOTOR DRIVEN

L563  +  5.400  7.200    .181   -.027   1.50 90U THICKNESS (CALIPER), TMI,      HAND DRIVEN
L243  +  5.416  7.088    .099   -.105    .87 90S THICKNESS (CALIPER), SCHOPPER, HAND DRIVEN
L285  *  5.443  7.146    .162   -.093    .70 90T THICKNESS (CALIPER), TMI,     MOTOR DRIVEN
L123F *  5.495  7.355    .363   -.015   1.09 90F THICKNESS (CALIPER), FEDERAL, MOTOR DRIVEN
L442  *  5.515  7.365    .382   -.025    .96 90V THICKNESS (CALIPER), TMI,     MOTOR DRIVEN,DIGITIZED

GMEANS:  5.273  7.068                   1.00
           95% ELLIPSE:  .350    .100   WITH GAMMA = 54 DEGREES
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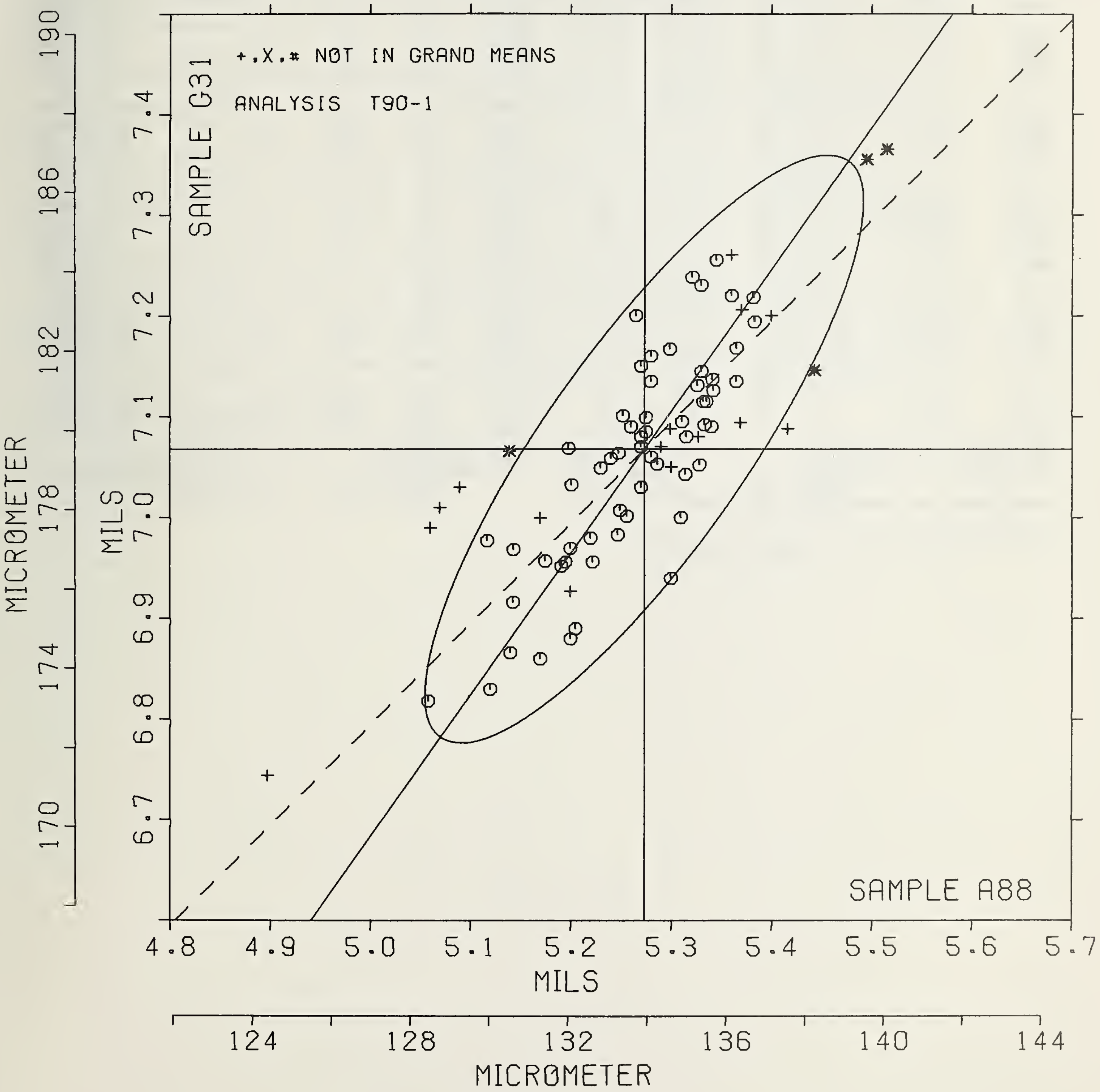
THICKNESS (CALIPER)

SAMPLE A88 = 5.27 MILS SAMPLE G31 = 7.07 MILS

SAMPLE A88 = 133.9 MICROMETER SAMPLE G31 = 179.5 MICROMETER



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T95-1 TABLE 1
GRAMMAGE (MASS PER UNIT AREA)
TAPPI OFFICIAL TEST METHOD T410 OS-79

LAB CODE	SAMPLE D37 MEAN	BUFF MANILA ENVELOPE 118 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	SAMPLE D38 MEAN	KRAFT 124 GRAMS PER SQUARE METER DEV	N.DEV	SDR	R.SDR	TEST D.= 10 VAR	F	LAB
L100	117.0	-.3	-.28	2.5	1.64	124.5	.4	.34	1.2	1.16	95C	0	L100
L121	116.8	-.5	-.51	1.7	1.09	123.2	-1.0	-.89	1.1	1.09	95B	8	L121
L162	117.0	-.3	-.28	.7	.47	123.6	-.5	-.48	.5	.54	95K	0	L162
L213	117.4	.2	.18	1.2	.78	124.4	.3	.29	1.0	1.01	95F	8	L213
L233	117.8	.6	.58	1.4	.93	123.8	-.3	-.27	2.1	2.06	95T	0	L233
L244	117.3	-.0	-.01	1.1	.72	123.5	-.6	-.56	.6	.60	95T	0	L244
L249	118.0	.7	.73	2.0	1.29	124.5	.4	.39	.9	.84	95I	0	L249
L280	117.8	.5	.56	2.0	1.31	124.9	.8	.71	.6	.56	95T	8	L280
L285	115.1	-2.1	-2.24	.6	.38	122.4	-1.7	-1.58	.5	.49	95T	0	L285
L305	117.4	.1	.15	.9	.59	125.8	1.6	1.50	.5	.48	95T	0	L305
L339	115.9	-1.3	-1.39	.6	.39	122.5	-1.6	-1.44	.0	.00	95T	0	L339
L442	117.7	.4	.42	1.3	.84	124.7	.5	.49	.3	.28	95K	0	L442
L484	118.0	.7	.77	2.2	1.46	124.6	.5	.43	1.1	1.05	95B	8	L484
L564	116.5	-.8	-.81	2.0	1.29	125.2	1.1	.98	.9	.90	95E	8	L564
L567	116.9	-.3	-.35	1.8	1.21	123.0	-1.2	-1.06	.9	.92	95E	8	L567
L571	118.1	.8	.87	2.6	1.74	123.6	-.5	-.48	1.6	1.62	95P	0	L571
L574	116.7	-.6	-.60	2.0	1.34	124.6	.5	.41	1.1	1.03	95D	0	L574
L604	115.3	-2.0	-2.11	1.5	1.02	122.6	-1.5	-1.42	.8	.77	95T	0	L604
L616	117.9	.7	.72	1.5	.98	125.0	.9	.84	.9	.85	95T	0	L616
L626	117.6	.3	.35	1.3	.87	124.1	-.0	-.04	.7	.70	95E	0	L626
L693	119.4	2.1	2.24	.5	.36	127.0	2.9	2.63	1.4	1.39	95G	0	L693
L704	117.5	.2	.24	1.8	1.20	123.9	-.2	-.22	3.3	3.19	95T	8	L704
L731	118.0	.7	.77	1.7	1.12	123.5	-.6	-.57	1.5	1.48	95X	8	L731

GR. MEAN = 117.3 G/SQ.METER GRAND MEAN = 124.1 G/SQ.METER TEST DETERMINATIONS = 10
SD MEANS = 1.0 G/SQ.METER SD OF MEANS = 1.1 G/SQ.METER 23 LABS IN GRAND MEANS
AVERAGE SDR = 1.5 G/SQ.METER AVERAGE SDR = 1.0 G/SQ.METER
TOTAL NUMBER OF LABORATORIES REPORTING = 23

Best values: D37 117.3 ± 2.0 grams per square meter
D38 124.1 ± 1.7 grams per square meter

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REPORT NO. 63G                  TAPPI COLLABORATIVE REFERENCE PROGRAM                         JANUARY 1980
                                       ANALYSIS 795-1  TABLE 2
                                     GRAMMAGE (MASS PER UNIT AREA)
                                  TAPPI OFFICIAL TEST METHOD T410 OS-79

LAB          MEANS        COORDINATES     AVG
CODE  F    D37    D38    MAJOR   MINOR  R.SDR VAR   PROPERTY---TEST INSTRUMENT---CONDITIONS

L285  0   115.1  122.4    -2.7      .6    .44 95T BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L604  0   115.3  122.6    -2.5      .6    .89 95T BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L339  0   115.9  122.5    -2.1      .0    .20 95T BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L564  0   116.5  125.2      .3     1.3   1.10 95E BASIS WEIGHT (GRAMMAGE), GUILLOTINE TYPE CUTTER
L574  0   116.7  124.6     -.0      .7   1.19 95D BASIS WEIGHT (GRAMMAGE), DIE CUT

L121  0   116.8  123.2    -1.1     -.2   1.09 95B BASIS WEIGHT (GRAMMAGE), CONCORA CUTTER
L567  0   116.9  123.0    -1.1     -.5   1.06 95E BASIS WEIGHT (GRAMMAGE), GUILLOTINE TYPE CUTTER
L162  0   117.0  123.6     -.6     -.1    .50 95K BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED
L100  0   117.0  124.5      .1      .4   1.40 95C BASIS WEIGHT (GRAMMAGE), CUTTING BOARD
L244  0   117.3  123.5     -.5     -.4    .66 95T BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT

L305  0   117.4  125.8     1.4      .9    .53 95T BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L213  0   117.4  124.4      .4      .1    .89 95F BASIS WEIGHT (GRAMMAGE), FOUR-SQUARE CUTTER
L704  0   117.5  123.9     -.0     -.3   2.20 95T BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L626  0   117.6  124.1      .2     -.3    .79 95E BASIS WEIGHT (GRAMMAGE), GUILLOTINE TYPE CUTTER
L442  0   117.7  124.7      .7      .0    .56 95K BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED

L280  0   117.8  124.9      .9      .1    .93 95T BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L233  0   117.8  123.8      .1     -.6   1.49 95T BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L616  0   117.9  125.0     1.1      .1    .92 95T BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L249  0   118.0  124.5      .8     -.3   1.07 95I BASIS WEIGHT (GRAMMAGE), INGENTO PAPER CUTTER
L731  0   118.0  123.5     -.0    -1.0   1.30 95X BASIS WEIGHT (GRAMMAGE): SHEET CUT BY WHAT DEVICE?

L484  0   118.0  124.6      .8     -.3   1.25 95B BASIS WEIGHT (GRAMMAGE), SQUARE AND BLADE
L571  0   118.1  123.6      .1    -1.0   1.68 95P BASIS WEIGHT (GRAMMAGE), PRODUCTION REAM CUTTER
L693  0   119.4  127.0     3.6      .2    .87 95G BASIS WEIGHT (GRAMMAGE), PRECISION CUTTER

GMEANS:   117.3  124.1                   1.00
           95% ELLIPSE:     3.6     1.5  WITH GAMMA = 50 DEGREES
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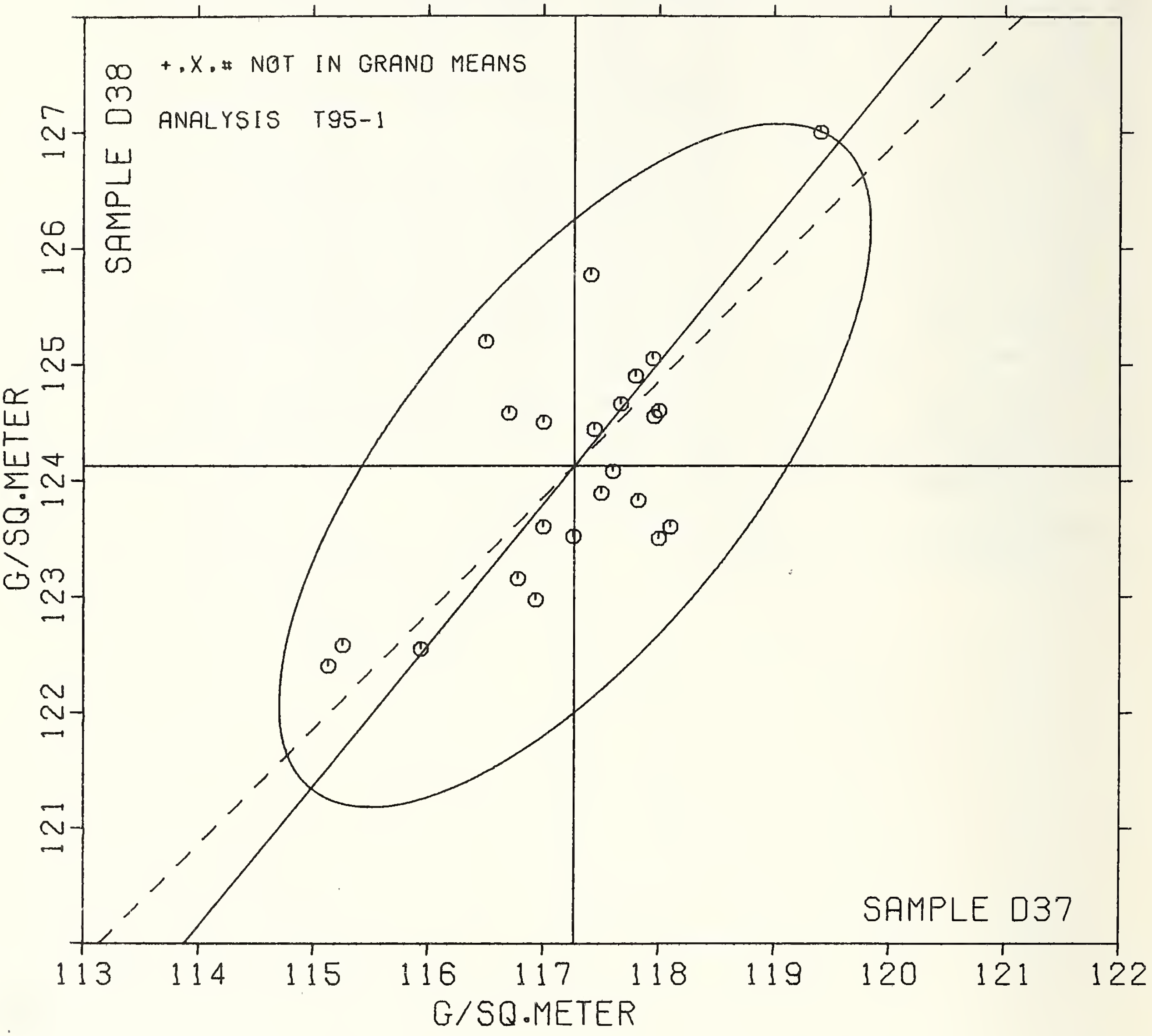

GRAMMAGE (MASS PER UNIT AREA)

SAMPLE D37 = 117.3 G/SQ.METER   SAMPLE D38 = 124.1 G/SQ.METER

SUMMARY TABLE

TEST METHOD	SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDS	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
AIR RESISTANCE, GURLEY	B68	49.2	3.2	4.7	10	58	65	10	4.1	8.9
T40-1 GURLEY UNITS	Z08	95.8	7.9	8.9					7.8	21.8
AIR RESISTANCE, SHEFFIELD	B68	71.2	4.9	6.6	10	37	46	10	5.7	13.7
T40-2 SHEFF. UNITS	Z08	36.2	3.1	3.0					2.6	8.5
AIR RESISTANCE, GURLEY BG FLOTATION	E37	764.	57.	103.	10	15	15	10	90.	157.
T41-1 SEC/10 CC	B73	1284.	253.	534.					467.	701.
SMOOTHNESS, PARKER PRINTSURF	A84	5.683	.248	.085	10	6	7	10	.074	.687
T44-1 MICRONS	A83	4.566	.196	.174					.152	.542
SMOOTHNESS, SHEFFIELD	A84	227.8	10.3	8.2	15	90	92	10	7.2	28.8
T45-1 SHEFF. UNITS	A83	107.5	9.5	11.4					10.0	27.0
SMOOTHNESS, BEKK	A84	13.05	.92	.84	15	10	12	5	1.04	2.67
T45-2 BEKK SECONDS	A83	54.93	7.36	9.25					11.46	22.43
SMOOTHNESS, BENDTSEN	A84	340.	27.	25.	10	11	11	10	22.	76.
T47-1 ML/MIN	A83	112.	21.	15.					13.	59.
MOISTURE	E66	6.08	.56	.14	10	11	14	2	.28	1.57
T53-1 PERCENT	G32	5.56	.43	.18					.35	1.24
K & N INK ABSORPTION	E44	29.6	4.1	.6	4	10	10	2	1.3	11.4
T56-1 K & N UNITS	G03	57.5	6.2	.6					1.2	17.2
OPACITY, B&L, 89% BACKING, FINE P.	G22	85.70	.73	.97	10	62	78	5	1.20	2.20
T60-1 PERCENT	G26	88.25	.73	.96					1.19	2.19
OPACITY,ELREPHO,PAPER BACKING,FINE P	G22	86.93	.43	.91	10	15	20	5	1.12	1.44
T60-2 PERCENT	G26	90.23	.44	.74					.92	1.38
OPACITY, B&L, 89% BACKING, NEWS	B01	75.15	.90	.70	10	21	28	5	.86	2.56
T61-1 PERCENT	A56	78.84	1.10	.92					1.14	3.14
BLUE REFLECTANCE, DIRECTIONAL	J34	67.20	.47	.20	8	24	56	5	.24	1.30
T65-1 PERCENT	J38	75.94	.48	.17					.20	1.33
BLUE REFLECTANCE, DIFFUSE, WITH TRAP	J34	66.38	.43	.16	8	13	18	5	.20	1.20
T65-2 PERCENT	J38	74.93	.37	.13					.16	1.04
BLUE REFLECTANCE, DIFFUSE, NO TRAP	J34	67.87	.41	.12	8	12	14	5	.15	1.13
T65-3 PERCENT	J38	76.69	.59	.09					.12	1.62
SPECULAR GLOSS, 75 DEGREE-HIGH RANGE	B80	60.9	2.0	1.7	10	41	43	5	2.1	5.8
T75-1 GLOSS UNITS	E51	68.0	1.9	1.1					1.4	5.4
SPECULAR GLOSS, 75 DEGREE-LOW RANGE	G23	16.4	1.4	1.6	10	19	20	5	1.9	4.0
T76-1 GLOSS UNITS	B47	47.8	2.2	1.8					2.3	6.3
THICKNESS (CALIPER)	A88	5.273	.087	.060	10	64	80	10	.053	.240
T90-1 MILS	G31	7.066	.115	.057					.050	.319
GRAMMAGE (MASS PER UNIT AREA)	D37	117.3	1.0	1.5	10	23	23	3	2.4	3.3
T95-1 G/SQ.METER	D38	124.1	1.1	1.0					1.6	3.3

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15. SUPPLEMENTARY NOTES

☐ Document describes a computer program; SF-185, FIPS Software Summary, is attached.

16. ABSTRACT *(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)*

Collaborative Reference Programs provide participating laboratories with the means for checking periodically the level and uniformity of their testing in comparison with that of other participating laboratories. An important by-product of the programs is the provision of realistic pictures of the state of the testing art. This is one of the periodic reports showing averages for each participant, within and between laboratory variability, and other information for participants and standards committees.

17. KEY WORDS *(six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)*

Collaborative reference program; Laboratory evaluation; Paper; Precision; Reference samples; Testing calibration

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